The Illicit Business of Terrorism

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SUMMARY OF THE DISSERTATION

This dissertation addresses a key variable determining the threat posed by terrorist groups. It relates the threat posed by terrorist attacks to how capable a terrorist group is to carry out attacks. As such, it links the threat not to the willingness of a terrorist group to conduct attacks but to its ability to do so. I maintain that for any active terrorist group the willingness to commit attacks is a necessary requirement. A terrorist group's capability, in contrast, depends on a variety of internal and external factors. Studying how differences in those endowments or constraints induce varying capabilities offers a tangible approach to understand the threat posed by a specific terrorist group.

I argue that in order to conduct attacks, a terrorist group needs resources. This dissertation discusses different aspects of how terrorist groups generate resources. Access to resources and a terrorist group's ability to manage resources helps to explain variation in the behavior of terrorist groups. To develop my argument I focus on the economic activities of a terrorist group, claiming that a terrorist group, just like a firm, needs to efficiently exploit its opportunities. With this argument I turn the attention to the economic activities of a terrorist group in preparation of the attack and away from the attack itself. I argue that terrorist groups acquire resources from interacting with their environment. The resource allocation is affected by the organizational structure as it determines whether a terrorist group can manage its resources efficiently. Thus, I highlight two steps of the resourcing process. One step focuses on the environment of terrorist groups and another highlights group-internal processes. I argue that both steps act independently from each other and interdependently.

I put my argument to three empirical tests analyzing the behavior of terrorist groups as a result of external environmental conditions and group-internal factors. First, I investigate why terrorist groups adopt either a centralized or a decentralized structure depending on environemental and group-internal conditions. Second, I assess to what degree external and internal factors can accurately predict a terrorist group's involvement in organized crime. Finally, I analyze the effect of a terrorist group's social capital and managerial capacity on its operational capability individually and jointly.

The clandestine nature of terrorist groups introduces non-trivial challenges in terms of data collection. In order to carry out large-n cross-sectional analyses on a global scale, I utilize a variety of existing data sourced from published data by other terrorism researchers. I enrich this collection of data by coding original data. The organizational structure and a terrorist group's involvement in organized crime are manually coded using publicly accessible information. The type of weapon a terrorist group uses in its attack approximates the operational capability of a terrorist group. The social capital of terrorist groups is operationalized with the position of a terrorist group within the cooperation network of 205 terrorist groups. To that end, I create a network of cooperating terrorist groups and calculate network measures to assess a terrorist group's access to social capital.

Chapter 1 motivates the research question addressed in this dissertation and discusses central theoretical and empirical contributions. Chapter 2 reflects the relevant literature as a foundation to understand terrorist groups as economic entities that can be affected by market conditions and managerial capacities. In chapter 3, I develop the theoretical argument. Chapter 4 is the first empirical chapter. In line with my argument, I find that the environment affects the likelihood of a terrorist group to adopt a centralized organizational structure. Additionally, I find ideology to have an effect as well, illustrating that both external and internal factors affect which organizational design a terrorist group adopts. In chapter 5, I utilize an inductive machine learning approach using a random forest classifier to test previously discussed environmental and organizational determinants of a terrorist group's involvement in organized crime. I find that organizational variables out-perform environmental ones in terms of predictive capacity. Group size and ideology are the most influential variables for leveraging accurate predictions.

In chapter 6, I analyze the influence of a terrorist group's social capital and managerial capacities to efficiently allocate resources by assessing the effect of a terrorist group's network position and its organizational structure on the operational capability. I provide evidence for an independent impact and an effect of a terrorist groups network position moderated by its organizational structure. I find that terrorist groups benefit from cooperating with terrorist groups that are well connected themselves.

My research shows that in order to analyze the economic activities of a terrorist group external and internal factors cannot be separated. Group-internal dynamics condition a terrorist group's external activities. The ideology and size of a terrorist group predict its involvement in organized crime. The organizational structure influences the operational output of a terrorist group by mitigating the effect of social capital. The organizational structure itself is also affected by a terrorist group's ideology, repressive conditions in the state it operates in, and societal conditions a terrorist group needs to address in order to mobilize sustained support.

The findings of this dissertation have important policy implications. By turning the attention to the economic activities of a terrorist group, this dissertation offers crucial and actionable insights for counter-terrorism researchers and practitioners. By focusing on the resourcing of terrorist groups we learn more about what a group is actually able to do. This approach disentangles the willingness of a terrorist group to commit terrorist attacks from its actual prowess. As counter-terrorism strategies that focus on undermining and destroying the ideology of terrorist groups are failing, tailoring a strategy to cut the supply of resources might be more promising to manage the terrorist threat.

Contents

[1] This chapter is based on a paper co-authored with Clayton Besaw, published in the Journal of Quantitative Criminology (2019).

[2] This chapter is based on a joint research project with Anna-Lena Hönig, which was presented at an earlier stage at the International Studies Association 57th Annual Convention, 2016, Atlanta, Georgia.

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Chapter 1

Introduction

1.1 Motivation and research question

Anecdotal evidence suggests that some terrorist groups have a specialized skill-set or product that they exchange with other terrorist groups. They act in accordance with Ricardo's theory of trade as they offer their specialized good to trade it in exchange for missing resources to increase their competitive advantage (Ricardo, 1951). The Provisional Irish Republican Army (PIRA) was very proficient in the use of various explosive devices in urban settings (Ward and Hackett, 2003). The Revolutionary Armed Forces of Colombia (FARC) on the other hand was well-skilled in guerilla warfare in remote country-side settings. After the Colombian government increased the pressure on FARC in the early 2000s, they needed to change their tactics and conduct attacks in cities. To gain the necessary know-how members of FARC met with members of PIRA who trained them in using explosives in an urban environment (Ward and Hackett, 2003). While FARC was trained in innovative tactics, PIRA received financial benefits and the opportunity to test their weaponry in a contentious setting without endangering their operation in Great Britain (Cragin et al., 2007). Michael Horowitz (2010) illustrates a similar case, finding that Hizbollah uses its connections to other terrorist groups to export suicide tactics. He finds that the probability for a terrorist group to adopt suicide attacks as part of their tactical repertoire does not only depend on the connections that a terrorist group has, but also on its organizational capability to incorporate the new operational and organizational requirements.

Both examples provide a narrative illustrating why terrorist groups engage in trade relationships with other terrorist groups. The foundation of such trade relations is the dynamic of demand and supply, meaning that for the shortage of a specific good there is another actor who supplies that good. Thus, engaging in trade and market exchange has several advantages. Terrorist groups can make better use of the potentially scarce and specialized resources they have. This allows them to exploit their comparative

advantage enabeling them to conduct terrorist attacks with higher frequency or intensity. They can access new technologies or know-how and improve their competitiveness in general, both against an enemy government and other terrorist groups. Thus, resources affect what a terrorist group manages to do. The ability of how often it can conduct an attack, whom it attacks and how it can carry out the attack is determined by its resources. Consequently, terrorist groups pose a significant threat only if they manage to generate the resources needed to carry out an attack.

While the example of cooperation between PIRA and FARC cooperating focuses on the exchange relationship between terrorist groups, the example of Hizbollah hints at the importance of internal group dynamics. This leads to the research question of this dissertation: *How do terrorist groups generate resources and how is the process of mobilizing resources affected by external exchange relationships and internal organizational dynamics?*

This dissertation addresses this question by studying the effects of resource generation as the interplay between internal and external factors on terrorist groups' involvement in organized crime and on their attacks. In their resourcing process terrorist groups combine internal (specifically allocation) and external (specifically acquisition) factors. Allocation refers to the distribution of resources through the organizational structure. Acquisition is analyzed with a focus on involvement in organized crime and inter-organizational cooperation between terrorist groups. In this dissertation, I study terrorist groups as an entity similar to business enterprises that face additional restrictions due to their illegal and violent output. I apply insights from the management literature and organizational theory to learn more about the performance of terrorist groups. A systematic combination of inter- and intra-organizational dynamics and exchange relationships is a novel approach and adds to the status quo of research.

It is important to understand the resourcing process of a terrorist group, as it is part of the preparation for an attack. These preparatory activities of terrorist groups leading up to an attack do not only stretch over a long period of time and make up the majority of what a terrorist group actually does, but also affect the danger emanating from a terrorist group. The terrorist attack itself is merely the observable tip of the iceberg that is the sum of a range of activities including fundraising, recruiting, training, and the development of specialized skills. Only if terrorist groups manage to resource their activities the threat becomes a reality, because "terrorists cannot live on idealism alone and even if their services do come cheap, they need to eat and to find ammunition for their guns" (Vittori, 2011, p. 13). Adopting a perspective that puts the economic activities of a terrorist group at the center of attentions allows researchers and practitioners to understand the resource flows of terrorist groups. As a consequence of such an understanding, economic activities can be disturbed reducing the range of activities a terrorist group can master (Winer and Roule, 2002).

1.2 Main theoretical argument

In this dissertation the focus is on the resourcing process of terrorist groups as an incremental feature that determines their behavior. The core premise is that not all terrorist groups are equally capable of inflicting harm on their enemy. I argue that, at a minimum, terrorist groups are constrained by their resources. Their access to resources and their ability to use resources introduces variation among the abilities of terrorist groups.

I propose that the differences in terrorist groups' actions vary significantly due to the variation in their resourcing process as resources are a necessary component for all attacks. I argue that the process of acquiring and allocating resources is influenced by a terrorist group's interactions with other actors on the illicit market and the organizational structure of the terrorist group. This reasoning is in line with the resource-dependence theory of legitimate business enterprises (Pfeffer and Salancik, 1978). I claim that much like firms, terrorist groups are dependent on the resources that are available in their environment as well as their capacity to extract and use those resources.

I pursue an interactive approach accounting for the fact that terrorist groups do not exist in a vacuum. They form relationships with other actors to trade assets for mutual benefit based on the market principles of demand and supply. This logic assumes that both the location of a terrorist group on the overall market and its organizational endowments affect its attacks. Depending on their market position and structural capacity to allocate resources some terrorist groups are better equipped to access and use resources more efficiently. While the exchange with other actors in their environment allows terrorist groups to tap into their resources and, as a consequence, increases their operational repertoire, the organizational structure of a terrorist group influences how well they can process these resources to use them in an attack. I argue that centralized groups are better equipped to coordinate their assets than decentralized groups.

I utilize a network approach that views organizations to be embedded in inter-organizational relations that are consequential for their activities. Instead of just focusing on dyadic exchange models, the network perspective highlights the effect of both direct and indirect relations between organizations. I demonstrate that a terrorist group's position affects its behavior. The network approach is enriched by focusing on the structural embeddedness of a terrorist group, combining it with the attributes of a terrorist group. I investigate the effect of organizational structure as one such attribute. The organizational structure determines how efficiently exchanges can be handled within an organization. Thus, an organizational structure that minimizes transaction costs, i.e., costs that relate to 'frictions' of transactions, allows terrorist groups to allocate resources more efficiently. I theorize that organizational structure is an intervening variable that moderates the effect of resource acquisition on a terrorist group's activities.

1.3 Empirical approach

Empirically, I expect a terrorist group's performance to vary in relation with its ability to mobilize resources externally (acquisition) and its ability to manage resources internally (allocation). I expect to observe that terrorist groups design their organizational structure to match their contextual challenges in their foundational year. I test this central argument by using different methodological approaches. I present methodological solutions and operational approximations to measure clandestine behavior of terrorist groups.

One inherent problem of research on terrorist groups and their behavior is their clandestine nature. The need for secrecy surrounding terrorist groups and their activities yields challenges for researchers in terms of availability and reliability of data. Information about the internal dynamics and inter-group relations is difficult or nearly impossible to gather, presenting challenges of incomplete or inaccurate data. To empirically test the theorized relationships, I present cross-sectional evidence, which is enriched by multiple detailed case examples. The most reliable information about terrorist groups that can be observed stems from their attacks. I assume that terrorist attacks are a valid indicator for the resources a terrorist group has (as is explained in chapter 2).

I combine information from various cross-sectional databases allowing me to use evidence on a global scale. I utilize the Global Terrorism Database (GTD) and the RAND Database of Worldwide Terrorism Incidents (RDWTI), which collect systematic information on terrorist attacks and their perpetrators since 1970. They provide data on the terrorist groups involved in an attack and the weapons they use to conduct the attack. To assess the context in which a terrorist group operates I use information on the country level that can be collected on a global scale. Young and Dugan (2014) apply a similar approach locating a terrorist group within a primary country. I use their data allowing me to attribute characteristics of the country as covariates affecting a terrorist group's behavior. Country-level information is available in a number of databases or hand-coded where this information was not readily available. Concerning organizational factors, I source information form event-data created by Gaibulloev and Sandler (2013). Since information is on the attack level, I aggregate the necessary information to the group level, allowing me to translate observable information from attacks to attributes of the perpetrator.

In order to study the exchange relationships between terrorist groups, I employ social network analysis. Analyzing cooperation between terrorist groups through a network perspective allows me to focus on the social structure that a terrorist group is embedded in. I evaluate the behavior of a terrorist group by analyzing structural dynamics that are the result of connections between terrorist groups. The network

approach displays exchange relations between terrorist groups and other actors. It enables the empirical assessment of the resource exchange between terrorist groups. As such, it is useful for understanding the acquisition of resources from the environment. Especially in the case of terrorist groups, whose activities are mostly clandestine and their internal structure opaque, a structural approach offers insights based on a more credible depiction of reality than approaches that rely only on matching attributes to behavior. Two of the most important variables are original data from hand coding. The involvement in organized crime is coded for 183 and the organizational structure for 144 terrorist groups.

I test the empirical implications of my argument with deductive (chapters 4 and 6) and inductive (chapter 5) research designs. In chapter 5, I assess a terrorist group's involvement in organized crime utilizing an inductive machine learning approach using a random forest classifier. With this approach, I deviate from the deductive analyses of the other chapters. While this method does not allow me to unpack a causal relationship between predictors and outcome, it is a useful tool for testing and developing theories. To explore the substantive relationships, I use cross-validation to estimate the out of sample accuracy of the prediction model.

1.4 Plan of the dissertation

This dissertation studies terrorist groups' acquisition and allocation of resources in seven chapters. The remainder of chapter 1 discusses the theoretical and empirical contributions of this dissertation. Chapter 2 provides a strategic definition of terrorism and conceptualizes terrorist groups as economic entities. It describes the market model of terrorism highlighting the importance of mobilizing resources to explain the behavior of terrorist groups. It provides a synopsis of previous literature on this topic and concludes with a discussion of previous conceptualizations of the organizational structure of terrorist groups.

Chapter 3 describes the economic market of terrorism by developing a comprehensive theory of resource acquisition and allocation. It links the performance of terrorist groups to their ability to extract resources from their environment through cooperation and their ability to allocate those resources internally. It provides an original definition of resources and opens up the "black box" of a terrorist group focusing on the effect of a terrorist group's organizational structure.

Chapter 4 presents the first of three empirical applications. I analyze how the organizational structure a terrorist group adopts is affected by the group's environment. In line with the argument, the analysis shows that the organizational design a terrorist group adopts depends both on the external conditions and on factors internal to the group.

Chapter 5 explores the determinants of terrorist groups' involvement in organized crime. Terrorist

groups become involved in organized crime predominantly to increase their financial revenues, which allows them to increase their tactical repertoire. Utilizing an inductive machine learning approach, this chapter evaluates previously identified factors that drive terrorist groups' involvement in organized crime. The findings suggest that organizational factors out-perform environmental factors concerning their importance for predicting out-of-sample cases of criminal activity.[1]

Chapter 6 investigates the relationship between resource acquisition and allocation on the operational capability of terrorist groups. Conceptualizing acquisition as the social capital of terrorist groups and allocation by their organizational structure, this study combines external and internal determinants of terrorist groups' capability. I identify a separate effect and also a moderation effect of organizational structure on terrorist groups' operational capability.

Chapter 7 summarizes the main findings. It concludes by highlighting the main contributions and implications of this dissertation for understanding terrorist groups' behavior resulting from a mixture of internal and external factors. It discusses some opportunities for future research.

1.5 Central contributions

1.5.1 Theoretical and conceptual contributions

The market model of terrorism

In this dissertation, I focus on the economic activities of terrorist groups going beyond the attack as one of their most commonly studied features. I focus on the economic market of terrorism, where short-term considerations of securing the supply of resources are key. With their activities on the economic market, terrorist groups alter their tactical repertoire enhancing what they can manage to do. The characteristics of the supply market provide opportunities and constraints for a terrorist group's behavior as they shape the terrorist group's ability to conduct operations, to acquire resources, and to evade counter-measures. They shape the organizational structure of a terrorist group, as it needs to adapt its internal governance to the external preconditions. They also shape the opportunities for terrorist groups to collaborate with each other or to engage in organized crime. With this approach, I focus on the opportunities that terrorist groups have to carry out violent activities. Considering that no terrorist group can carry out attacks if it does not have the opportunitiy to do so, my work can inform counter-terrorism strategies to focus not only on undermining the ideological narrative but also on limiting a terrorist group's opportunities regarding supply markets.

[1] This chapter is based on a paper that is co-authored by Clayton Besaw (One Earth Future Foundation, Broomfield, USA) and is published in the *Journal of Quantitative Criminology*.

The resource-based view of the terrorist group

In this dissertation, I develop a resource-based view of the terrorist group integrating management literature and terrorism research to customize concepts from the management literature to the context of terrorism. I conceptualize terrorist groups as economic entities employing the rationale of a business. By focusing on business activities, I highlight the importance of resources. I develop a theoretical model of a) the resource generation process, and b) the effect of resources on the behavior of terrorist groups. To that end, I conceptualize the mobilization of resources as a combination of external (acquisition) and internal (allocation) processes. In order to identify mechanisms how resources are handled within this two-step process, I make two distinct contributions. First, I provide an original classification of resources based on their tradability. Second, I contribute to the organizational perspective (**?**)on terrorism by opening up the "black box" that is the terrorist group. Considering how difficult it is to investigate internal dynamics of clandestinely operating groups, approximating resource allocation through the organizational structure of terrorist groups is an important step towards extending our understanding of the inner workings of those groups. This understanding can be transferred to the study of other clandestine groups, such as rebel groups, militias, or criminal entities.

1.5.2 Empirical and methodological contributions

Integrating various datasets with original data

Quantifying the behavior of terrorist groups is a difficult undertaking. Reliable large-n information is scarce and available mainly on the event level. A lot of terrorism research is actor- or event-driven, is investigating a specific phenomenon (i.e., suicide terrorism or cyber-terrorism) or a specific region, and is often employing case studies a research design. I adopt a quantitative large-n design on a global scale. I integrate existing databases and aggregate event-level data with group-level data if necessary. Based on an original operationalization and coding of four variables that are crucial to my analysis, I add unique information to the existing data sources. First, I code the organizational structure of terrorist groups as either centralized or decentralized based on three features (leadership, functional differentiation, and centralized command and control). Second, I code a terrorist group's involvement in organized crime capturing whether a terrorist group is involved in the trafficking or production of drugs, the trafficking of weapons or humans, whether they launder money, or a combination of those. Third, I operationalize the cooperation between terrorist groups as their co-presence in an attack that I further develop as an original measurement using social network analysis. Finally, I contribute to the debate about adequately measuring the performance of terrorist groups, by approximating the operational capability of a terrorist

group with the actual weapon used in an attack. Those variables are integrated into an original dataset that can be utilized in future research.

Combining social network analysis with deductive null-hypothesis testing

The main hypothesis of this dissertation states that terrorist groups acquire resources from interacting with their environment and allocate the resources internally more or less efficiently, depending on their organizational structure. In order to test this relationship Social Network Analysis (SNA) is the most suitable analytical method. Using SNA to study the behavior of terrorist groups is helpful, as it does not take the individual terrorist group out of its context but conceptualizes the behavior as the result of a terrorist group's interactions with other actors. The position of a terrorist group within the entire network of terrorist groups determines its access to resources influencing what it is able to do. SNA allows me to combine patterns of interaction with individual attributes. As such, I integrate measures indicating the network position from a preceding network analysis with covariates measuring group attributes or environmental factors in a deductive regression model.

Inductive machine learning classification of involvement in organized crime

In chapter 5, I use an inductive machine learning approach to analyze terrorist groups' involvement in organized crime. I use a random forest classifier that uses an ensemble of individual decision trees to produce out of sample predictions of whether a terrorist group has engaged in organized crime. I argue that the random forest classifier outperforms the deductively driven logistic regression model due to its ensemble method and the absence of strict functional form assumptions. Especially in the field of quantitative terrorism studies, where measures are victim to incomplete data and measurement bias favoring openly accessible information, relying on regression models may violate model assumptions. To unlock the "black box" of the random forest algorithm and to address matters of causal inference, I examine three aspects of the random forest: a) k-fold cross validation explores the efficacy of individual predictors, b) measuring the importance of variables indicates which variable affects the predictive accuracy the most, and c) partial-dependence functions visualize the relationship between predictor and outcome. This analytical approach provides rigorously tested preliminary evidence for further theory building and future deductive hypothesis testing.

Chapter 2

Terrorism in the broader context

This chapter locates terrorism in the broader context of political violence and provides a definition of terrorism as I use it in this dissertation. I consider terrorism to be a political strategy actors choose to further their agenda. I start with a discussion of this strategic conceptualization before I elaborate its implications on the tacticals of terrorists activities. I proceed to discuss the rationality of terrorism, which I assume to be guiding terrorists behavior. Following a synopsis of the definitional debate, I present my working definition of terrorism and introduce my conceptualization of terrorist groups as economic entities. I introduce my original market model of terrorism. I use this model to highlight the importance of focusing on the economic activities and the resources of terrorist groups to better understand the terrorist threat. I argue that we need to focus on the external opportunities and constraints as well as internal organizational dynamics of terrorist groups to understand why terrorist groups act the way they do. I conclude this chapter with a discussion of previous work focusing on the organizational structure of terrorist groups. Subsequent chapters build on the literature discussed here.

2.1 Terrorism as a political strategy

The concept of terrorism is contentious. Established scholarly conceptualizations of sub-state terrorism tend to focus on two dimensions. First, terrorism is defined as a specific tactic that manifests itself as the discriminate and indiscriminate use of violence against non-combatants (Crenshaw, N.d.; Hoffman, 2006; Jongman and Schmid, 1988; Kalyvas, 2004). Second, the use of violence by terrorist organizations takes a political and social purpose while seeking to intimidate a larger audience beyond the immediate victim(s) (Hoffman, 2006; Laqueur and Alexander, 1978; Sandler and Enders, 2007). Terrorism is coercive, as it makes others act or refrain to act in a way they would not do otherwise (Asal and Rethemeyer, 2008). Terrorism is a strategy that helps terrorists to achieve their political goals (Kydd

and Walter, 2006). A strategy is a plan on how to best achieve a political objective, whereas a tactic is the means through which this objective is to be achieved. A goal could be regime change, the strategy used to pursue this goal may be to provoke the enemy government into an overreaction, and the tactic considered most effective might be the use of suicide attacks on civilian targets.

The debate surrounding the definition of terrorism highlights the need of locating terrorism within the spectrum of political violence. Studying the overlap between civil war and terrorist tactics, terrorism is conceptualized as a tactical tool (Page, 2015; Stanton, 2013). The dominant strand of literature does not view terrorism as distinct but rather as one tactic among many employed within a violent conflict (e.g., Asal, Ackerman and Rethemeyer, 2012; Ganor, 2002; Goodwin, 2004, 2006; Moghadam, Berger and Beliakova, 2014; de la Calle and Sánchez-Cuenca, 2015; Tilly, 2004). This approach includes the entire range of contentious activities that have different costs and benefits attached to them. Therefore, all violent activities may potentially be employed by all kinds of actors as a means to communicate their objectives to the opponent. In the tactical sense, terror is used in the context of a wider campaign, most likely as one alternative of contentious behavior among many (Goodwin, 2004). Actors choose it because they deem the benefits to outweigh the costs rendering terrorism as the relatively more attractive option to choose from the repertoire of contentious behavior (Abrahms, 2008; Tilly, 1995). Additionally, a clear distinction between the types of political violence is often difficult due to amorphous properties of actors and that different types of political violence are nested together. Their goals and strategies could be fairly similar. For example, both terrorists and insurgents are non-state actors that may seek to coerce the opposing government to make territorial changes or governmental reforms. According to Freedman (2007, p. 325) the objective of insurgency is "to undermine the morale of the state's forces, through constant harassment and ambush, so that their capability deteriorates as support for the insurgency grows to the point where it is possible to mount a direct challenge and defeat them in battle."

The distinction between terrorism and insurgency is that the former use an indirect targeting strategy, while the latter use direct confrontation to fight for their objective. Terrorists and insurgents operate covertly and use hit-and-run tactics to minimize the costs of the fight, for it is more difficult for the opponent to detect them (O'Neill, 2005, p. 35). Conventional armies may not be apt to engage terrorists or insurgents with the same means, weakening their position in the conflict (Arreguín-Toft, 2001). While insurgents attack members of the state and armed forces seeking direct confrontation, terrorists attack civilian targets indiscriminately (Crenshaw, N.d.; Lane, 2010). The identity of the victim is negligible as long as it is part of the enemy audience. The victim is usually just one representative of the wider target audience. Terrorists attack the population based on the calculus of exerting an indirect effect on the governments of those societies.

This tactic of attacking civilians is rooted in two reasons. First, it stems from a position of relative weakness as the terrorists lack the military capacities to directly engage with the government forces. Second, targeting civilians or non-combatants is a strategic choice, since civilians are assumed to have a lower tolerance for violence (Freedman, 2007, p. 325). Civilians demand a secure environment. They put pressure on the government to provide security. In cases of terrorist attacks, the fear to be victimized can be utilized by terrorist groups.

In sum, the purpose of terrorism is twofold. It aims at coercing the enemy government into concessions. It does so by increasing the pressure on the government by targeting the civilian population. To increase this effect terrorists are relying on relatively sophisticated methods of communication. Jenkins (1975, p. 15) claims that "terrorists want a lot of people watching, not a lot of people dead." This still holds considering the energy that the so-called Islamic State (IS) puts into marketing streaming videos of their operations online. Terrorists need the media attention to increase their impact. It is widely recognized that terrorism is not just about the act of violence itself but just as much about the threat of violence hovering over a society. Terrorism is deliberately aiming to have far-reaching psychological repercussions beyond the actual target. In that sense, terrorism is like theater (Combs, 2016).[1]

Terrorists need to attract attention to their grievances to "stir up the masses, force the people out of their age old sleep, [and] show them clearly that there exists a force which is fighting against their enemies and protecting their interests" (Nikolai Bukh, quoted in Hardy, 1987, p. 212). The intent is to motivate supporters to fight and convince them that the cause is just, while at the same time provoking and demoralizing the opponent. It captures the belief that a well-placed bomb is effective in stirring up a revolutionary sensation and a willingness to break the status quo within the population (Freedman, 2007, p. 316).

This discussion highlights the conception of terrorism as a tactic that is employed strategically to further political or militaristic goal. Terrorism as a strategically used tactic is defined by the relationship with the opponent (Kydd and Walter, 2006; Neumann and Smith, 2005; Abrahms, 2006; DeNardo, 1985; Pape, 2003; Crenshaw, 1988, 1990). A terrorist group calculates the expected reaction of its opponent to its activities. Given its expectation a terrorist group uses a specific tactic that is assumed to render the greatest benefit. They need to tailor their activities towards a stronger opponent intended for coercion. Their activities are meant to change the opponent‘s attitudes and behavior. Without this intention of affecting the target‘s behavior, the activities are not strategic (Freedman, 2007, p. 320). Usually, a terrorist group needs to rely on few resources to accomplish their goals (Arreguín-Toft, 2001;

[1] As the director Alfred Hitchcock points out, "there is no terror in the bang, only in the anticipation of it." Actors using terrorism have certainly adapted this cinematographic element.

Crenshaw, N.d.; Freedman, 2007).

2.2 Rationality of terrorism

The strategic framework implicitly assumes that terrorists behave rationally, both individually and collectively. The assumption of rationality is crucial. If terrorists behave consistent with a rational calculus, the knowledge of their beliefs and preferences can help to understand, analyze, and ultimately better predict their behavior. This can inform counterterrorism activities to be more effective. While popular perception might point to the perspective of terrorists being "a bunch of crazy dudes that like to blow stuff up" (Forest, 2012, p. 1), this perception does not seem to hold under closer inspection. Terrorist attacks are premeditated and follow careful planning. When making decisions grounded in rational reasoning, terrorists consider the perceived benefits, evaluate the acceptability of risks and of expending the necessary resources required for a successful operation, and consider their available information about their options (Berrebi, 2009). Rationality of actors is an assumption often made by researchers to better understand and classify the behavior of actors. Rationality can be determined by objective and subjective factors, allowing researchers to limit the notion of strict rationality under specific circumstances. While the concept of rationality can remain an academic assumption, empirical patterns can lend support to terrorists and terrorist groups to act rationally, lending it credibility and empirical usefulness.

Every conceptualization of terrorists as rational utility maximizers needs to allow room for misperception and miscalculation (Simon, 1982). Simon (1982) defines the concept of bounded rationality, which opens up possibilities to evaluate strategic calculations in light of situational and human constraints. Misperceptions and wrongly defined preferences can result in miscalculations. Terrorist groups may lack the ability to gather sufficient information or their leaders may be cognitively biased by preconceptions or predefined stereotypes. Physical exhaustion in battle situations, emotions, or short decision times may also lead to miscalculation (Crenshaw, 1990, p. 13-15). These circumstances can help to explain terror attacks, which are not beneficial to the overall objective of the group.

Every terrorist group needs to cater to a specific audience and have a clear goal, which they communicate to their audience. The type of the attack and the target of the attack must not have counterproductive effects that may undermine potential support and legitimacy. For example, al-Qaeda (AQ) debated over the reach of their violent Jihad and whether they should focus on the 'far enemy' or the 'near enemy' (Sageman, 2004). While many of their constituency supported their fight against the West in general and the U.S. and Israel, in particular, they did not support attacks on other Muslims in their countries and the fight against the near enemy. Thus, AQ had to consider the consequences of their

attacks for them to sustain their supporting constituencies.

Besides Herbert Simon (1982), several scholars developed theories on how to explain seemingly irrational rationality. Caplan (2000, 2006) contents that the notion of strict individual self-interest is too narrow and that useful rational models need to reconcile individual selfishness and collective group preferences and expectations. Other theories account for the importance of individual values (Weber, 1978), or pride and recognition instead of strict self-interest (Vershney, 2003), or cases when collective objectives trump individual interests (Schelling, 1966).

In general, there are three levels of rationality (Caplan, 2006, p. 93). In the weakest sense, activities are considered to be rational as long as they are used to achieve predetermined goals. In the stronger manifestation of rationality actors choose actions based on stable utility functions and while considering the constraints facing them. Rational actors are assumed to maximize their utility in light of the constraints they face. Conceptually, utility functions summarize the factors that affect an actor‘s overall well-being. Those factors can include intangible psychological or social rewards that need to be understood to explain terrorism with a rational lens. In the strongest sense, actors always respond to incentives and behave according to rational expectations, that is, they are capable of clearly defining their preferences in a strict rank ordering. They need to have sufficient and correct information to do so.

Ample empirical evidence suggests that terrorists behave rationally both on the operational level and on the strategic level (Berrebi and Lakdawalla, 2007; Montalvo, 2011; Pape, 2005; Gambetta, 2005). This highlights the empirical relevance to apply the rational framework to analyzing terrorists behavior. If the notion of rationality were an academic assumption alone, we would not observe patterns of cost-benefit calculation and ordered preferences.

Operationally, both the timing and the target are not randomly chosen (Berrebi and Lakdawalla, 2007). The identity of the individual victim is not very important as a target is chosen for its symbolic gesture. The individual is victimized as a member of a specific target audience in general. The target is chosen after considering its value combining attractiveness, feasibility, accessibility, and cost (Benmelech and Berrebi, 2007). The timing of attacks also follows rational reasoning. Attacks can occur before elections affecting the political discourse in a country (Montalvo, 2011) or in certain intervals to increase the threat level and fear within a society.

On a tactical note, several scholars have discussed the rationality of suicide attacks (Gambetta, 2005; Pape, 2005). Accounting for success rate, target value, and attention, suicide attacks are the rational tactical choice. Suicide bombers are the ultimate smart bomb. They can penetrate security parameters with relative ease, can detonate only when the target is present, create extensive media attention, and bestow authenticity upon the perpetrators (Gambetta, 2005, p. 264).

There are many statements that underline the objective of reaching one's goals by using violence. Terrorist attacks, for example, are intended to increase the economic hardship of the enemy, making it harder to sustain counter-initiatives or offer prosperity. In the video AQ released in 2004, Osama bin Laden refers to their fight in Afghanistan and their plans, saying that, "We, alongside the mujahideen, bled Russia for 10 years, until it went bankrupt and was forced to withdraw in defeat. (...) So we are continuing this policy in bleeding America to the point of bankruptcy" (Whitaker, 2004). That strategic thinking, linking means to an end, are not empty statements by ideological leaders becomes evident in empirical patterns and trends. Abadie and Gardeazabal (2003) show that the attacks by Euskadi Ta Askatasuna (ETA) had a significant impact on the economy in the Basque country.

In sum. terrorists and terrorist groups should be assumed to act rationally. They are rational in the sense of their actions being consistent with their goals. Their utility might not be restricted to self-interest but transcend the individual in favor of group benefits. Terrorists' rationality might also account for future payouts. The utility concept applied here includes more than selfish material self-interest and immediate payouts (Mill, 1879). Given the preferences and surrounding state of the world, terrorists act in reasonable ways (Berrebi, 2009).

Accounting for a rational calculus of terrorists and terrorist groups allows for a better understanding and categorization of terrorist groups' behavior. Especially when analyzing the economic activities of terrorist groups, a rational conception is useful. Business transactions are rarely emotional and random, but serve a strategic purpose of increasing ones capabilities to ultimately put pressure on the opponent and communicating to the respective constituencies. The resource acquisition and allocation of terrorist groups is based on their opportunities and preferences making the rational framework applicable. The resource generation of terrorist groups needs to be considered in light of its benefits and costs for achieving their goal.

2.3 Terrorism – a definitional debate

This section addresses the question of what terrorism is and how it should be defined. What do we mean when we talk about terrorism? And what makes an organization a terrorist group as opposed to another violent group? The definition of terrorism and consequently that of a terrorist group is a contentious issue among researchers as well as practitioners. Prone to many challenges and points of perspectives no clear-cut definition is available. I build on this discussion to provide a working definition for terrorism and terrorist groups that forms the basis of the theoretical argument and empirical tests in this dissertation.

One problem of defining terrorism is that there are many definitions that sometimes complement or compete with each other. In research and in practice acts of violence are increasingly labeled as terrorism. The blurred usage of the term terrorism is leading to conceptual confusion and ambiguity, ultimately affecting appropriate behavior in the face of terrorism and effective response. International counter-terrorism coordination is severely hampered by the fact that different countries adopt different and divergent definitions of terrorism and persons committing terrorist activities. This highlights the need to decide on a specific definition that allows the results and conclusions drawn from the analysis to be compared with other studies. What some states may call terrorism another country may call a fight for freedom and against oppression. Yasir Arafat, chairman of the Palestine Liberation Organization (PLO), highlights this conundrum in his address to the UN General Assembly in 1974 when he states "the difference between the revolutionary and the terrorist lies in the reason for which each fights. For whoever stands by a just cause and fights for the freedom and liberation of his land from invaders, settlers and the colonists, cannot possibly be called a terrorist" (Hoffman, 2006, p. 26). Considering that the evaluation of what might constitute a just cause is bound by subjective opinion, it is not surprising that there is no internationally recognized definition of terrorism.

This is not only an international problem. Even within one state, different government institutions use different definitions. Within the U.S. government, for example, there are different definitions. The U.S. State Department defines terrorism as "premeditated, politically motivated violence perpetrated against noncombatant targets by sub-national groups or clandestine agents, usually intended to influence and audience" (quoted in Whittaker, 2003, p. 9). The Federal Bureau of Investigation (FBI) uses a different definition, where terrorism is the use of serious violence against persons or property, or the threat to use such violence, to intimidate or coerce a government, the public, or any section of the public in order to promote political, social or ideological objectives (Gearson, 2002, p. 9). These definitions include criteria such as motivation and nature of the perpetrators, target selection and coercive strategy.

Brian Jenkins (1980, p. 1) writes, "What is called terrorism (...) seems to depend on one's point of view." The term terrorism is very much an instrument of political debate itself. It implies a moral judgment as much as it increases ones own legitimacy. Empirical analysis, however, requires a tangible and objective definition for unbiased results. The following section elaborates the academic debate surrounding terrorism and results in a working definition of terrorism that is objective, tangible, and empirically useful.

Jongman and Schmid (1988) have collected over 100 definitions of terrorism that are most often used in research, highlighting the elusiveness of the concept. Scholars discuss the degree to which groups use terrorism, the possession of territory, the nature of their victims, as well as their motivation

(Asal, Ackerman and Rethemeyer, 2012; Sanchez-Cuenca and Aguilar, 2009). Terrorists distinguish between the actual target of their violence and the wider audience they want to communicate with. By attacking civilians, terrorists spread fear trying to indirectly gain their political goals. Terrorist attacks need to be distinguished from acts of communal violence such as riots (de la Calle, 2007; Wilkinson, 2004). While riots are spontaneous acts of contention, terrorism is a long-term organized challenge against the state (Sanchez-Cuenca and Aguilar, 2009). This definition also sets terrorism apart from civil war, where the main actors are guerillas fighting to achieve their goals by engaging their opponent directly. In terrorism the perpetrators attack civilians indirectly pressuring the government (Sambanis, 2004).

A definition is only as good as it is empirically useful. Empirical research requires definitional clarity since its results and conclusions need to be interpreted and compared to other studies. Only then can a study provide new insight. Otherwise the results add to an already hardly comprehensive field of research, or are even repetitive. Including too many elements into the definition leads to too many moving parts making it difficult to empirically pin down a terrorist act (Young and Dugan, 2014). Young and Dugan (2014, p. 6) argue that maximalist definitions confuse how the definitions relate to other concepts. They illustrate that definitions including, for example, the innocence of victims should exclude any attacks on military targets thus excluding attacks like the one on the USS Cole in 2000 or the bombing of the Marine barracks in Lebanon 1983 (Young and Dugan, 2014, p. 6). Other scholars label attacks against the military personnel, which is not actively engaged in combat operations at the time, terrorism. While it is necessary to exclude definitional elements that lead to empirical confusion, a minimalist definition is also problematic since it fails to sufficiently distinguish between dissimilar events (Goertz, 2006; Munck and Verkuilen, 2002).

This debate highlights several aspects. One aspect deals with the definition of actor attributes versus the definition focusing on the action itself. Several scholars claim that considering terrorism as a strategy and tactical choice provides more insight than focusing on organizational attributes (Tilly, 2004). Given that several terrorist organizations morphed into political parties or social movements or the other way around, a distinction based on actor attributes may not provide enough clarity needed for empirical analysis (Crenshaw and Robinson, 2010).[2] Further, it highlights that terrorism is a doctrine gaining its political effectiveness through the propaganda by the deed aimed at generating fear and coercive violence, as well as a tactic targeting indiscriminately both to complement other types of violence but also to set it apart from those.

[2]Examples for such organizations are African National Congress (ANC), Irgun, or Hamas that adopted (or partly adopted) a strategy of peaceful political participation.

2.3.1 A working definition of terrorism

The definition of terrorism and terrorist groups that I use throughout this dissertation needs to build on this debate. It requires clear characteristics to develop a theoretical framework and to allow rigorous empirical testing. To be able to explore mechanisms of resource acquisition and allocation, the definition of terrorism and terrorist groups needs to be grounded in the strategic rationale of actors who use terrorism. Therefore, this chapter concludes the synopsis of the contentious debate around definitional issues of terrorism with a working definition of terrorism and terrorist groups. It leads to conceptual constraints, which I make in this dissertation in order to restrict the sample of actors to which this analysis primarily applies.

In this dissertation terrorism is defined by the nature of the act rather than by the nature of the perpetrator. I define terrorism as the deliberate use or threat of violence for political purposes against non-combatants to spread fear among the target population. Terrorist groups use attacks to mobilize support for their cause among the sympathetic part of the population.

The use of terrorist activities is a political strategy. Whether the political inspiration is nationalistic, ethnic, religious, separatist, leftist, or rightist, the actors seek to change the political order in a more or less fundamental way (Goodwin, 2006, p. 2030). It is set apart from activities that pursue economic gains. Criminal organizations, for example, are not considered a terrorist organization, as their objective is not a political one, but to maximize their revenue (Makarenko, 2004*a*). Many terrorist organizations are involved in criminal enterprises as a means for revenue generation. This is merely a means to sustain themselves and their political campaign, but not the end in itself.[3] The Italian mafia, for example, are not considered terrorist actors. While they have large political influence and use violence to further their goals, their aim is not to overthrow the political, economic, or social order. A political strategy can include, for example, the fight for a socialist revolution, a separate geographical territory, the abandonment of immigration, or the introduction of Sharia law.

While terrorism is always inherently political it is also about power. Terrorists act very much Clausewitzian as they regard terrorism to be the continuation of politics by other means.[4] Terrorists pursue power to put pressure on the enemy government, change power relations and over time improve their bargaining position to coerce the government into concessions.[5] They deliberately use violence to affect the decisions and actions of their opponent. Their use of violence is a signal of their commitment and

[3] This mechanism is explored more detailed in chapter 5.

[4] Carl von Clausewitz famously proclaimed war to be the continuation of politics by other means (Clausewitz, Howard and Paret, 1976)

[5] Kydd and Walter (2006) identify five political objectives: regime type, territorial control, policy change, social control, and status quo maintenance.

ability to increase the costs imposed on the enemy population.

Terrorism also has a psychological effect. Terrorists are the weaker actor in asymmetric power relations with the opponent government. Therefore, terrorists consciously employ the use or threat of violence against civilians provoking fear among the population. By threatening civilian lives and security, terrorists aim to put pressure on the government. They strategically provoke their enemy into overreacting and making mistakes that result in increasing support for the terrorist's cause (Fromkin, 1975; Kydd and Walter, 2006). Kydd and Walter (2006) illustrate provocation with the example of ETA. ETA was faced with extreme countermeasures ultimately evoking more sympathy among the population.

Their actions are also meant to mobilize their own constituency to support their cause and organization (Kydd and Walter, 2006). Their activities reflect not only the need to pressure their opponent but also the need to communicate with their supporters. IS, for example, is inspiring individuals and small cells of individuals all over the world to conduct attacks that are relatively easy to manufacture (Zoli, 2017). IS benefits in two ways by using tactics that are relatively easy to emulate. First, it manages to spread fear among its enemy population provoking societies and governments into actions they would probably refrain from otherwise. Second, it motivates sympathizers and followers to conduct similar attacks in the name of IS. My working definition of terrorism focuses on the violent activity rather than on the actor, on the political strategy to pursue power and to pressure the opponent using means of asymmetric confrontation with the terrorist group being the weaker actor. This definition provides clear-cut indicators for developing my theoretical framework but also for selecting the empirical cases on which I test my theoretical implications.

I restrict the application of this definition to non-state actors using terrorism. I exclude state actors to omit large-scale oppression of society or parts thereof using methods that instill fear and anxiety within a population (Hoffman, 2006, p. 15). Faced with the uncertainty of their security and freedom the population is literally 'terrorized' by the state. As the modus operandi is very different, combining both state and non-state terrorism in one empirical analysis might very well lead to biased and misleading results, since conceptual and empirical ambiguity conflates distinct phenomena.

Oftentimes, authors do not provide a systematic definition of a terrorist group but rather assume it implicitly to be clear to the reader. The analytical purpose of this dissertation requires a definition of a terrorist group that considers the organizational intricacies. This perspective is not a new one. Martha Crenshaw (N.d.) advocated the organizational perspective on terrorism and terrorist group decision-making. She argues that the decision to use terrorism instead of some other tactic can be attributed to internal dynamics of the organization (Crenshaw, N.d.). This dissertation contends that internal dynamics are important for explaining the degree of violence used by a specific group. To that end, I see the

terrorist group as an economic entity focusing on the organizational dynamics of the terrorist group as it engages in activities to generate revenue and enhance their performance. By doing that, I aim to better understand terrorist behavior accounting for such organizational differences. In the following I discuss the economic conceptualization of terrorist groups. This serves as a foundation to develop my original market model of terrorism, where the differences in economic activities introduce variation between terrorist groups' activities and the threat they ultimately pose.

2.3.2 Terrorist groups as economic entities

I conceptualize terrorist groups as economic entities. This approach aims at opening up the "black box" that is a terrorist group, contributing to the understanding of how organizational and operational decisions are constrained by features of the organization and its economic activities of generating revenue by engaging with their environment. Underlying my general argument is the assumption that what a terrorist group does on the economic market affects their political outcomes. In that respect a terrorist group is an illicit economic enterprise. Much like any kind of firm, it is concerned with delivering a good, for which it needs the resources to produce it and the means to promote it. In less abstract terms, terrorist groups want to conduct attacks to further their political objective. They need to promote their attacks to their audience, which consists of their enemy population but also their supporting constituency. To be able to deliver these attacks, terrorist groups need to generate resources to have the money, material, or people needed for their operations. Assuming that an attack is the sum of a terrorist groups motivation and ability, this conceptualization focuses on the activities affecting a terrorist group's ability to carry out an attack. The relevance of an economic approach to terrorism is clear. Christina Liang (2015) portrays the Islamic State as a modern business enterprise, whose strength lies in the fact that it possesses its own means of income generation and financing. Focusing on the resources and economic activities of terrorist groups offers a tangible approach to explaining differences in group behavior. Given the covert intricacies of terrorist organizations, identifying motivational nuances is significantly more challenging and prone to error.

My premise is that terrorist groups act similar to business enterprises (Horowitz, 2010; Jackson, 2001; Zelinsky and Shubik, 2009; Shelley, 2014). The conceptualization of terrorist groups as an economic entity not unlike a regular firm allows researchers to tap into a broad literature investigating firms' market interactions (Lavie, 2006; Stuart, 2000) or management decisions. Assuming that terrorist groups are subject to similar opportunities and constraints, when it comes to their resourcing activities as legal firms or illegal criminal actors, enables a wider perspective whilst zooming into the "black box" that is a terrorist group.

Horowitz (2010, p. 39) examines the diffusion of suicide tactics between terrorist groups, comparing terrorist groups to businesses that have a set of expertise and products to offer. Their product range includes attacks of various types, ranging from armed assaults, hijackings, or crashing a car into a crowd of people. By comparing terrorist groups to businesses, Horowitz can tap into the literature of product innovation (Henderson, 1993; Rogers, 1995) and diffusion models (Lee and Strang, 2006; Simmons, Dobbin and Garrett, 2006). He makes a considerable contribution to the better understanding of why terrorist groups adopt specific tactics. Adams (1986) analyzes how a terrorist group's financing strategy affects how long a terrorist group survives. He finds that those groups that managed to morph into an entity that resembles multinational corporations are the most persistent over time. He was the first to conceptualize terrorist groups as a business model. His research shows that terrorist groups that mange to utilize the international monetary system and develop mechanisms inside their organization to access the globalizing market live the longest.[6] Both Horowitz and Adams focus on the consequences of economic activities of a terrorist group. They highlight the importance of analyzing the behavior of terrorist activities using an economic perspective.

Only few researchers conceptualize terrorist groups as a business enterprise. Louise Shelley (2014, p. 175) focuses on the business strategy of terrorist groups analyzing "their approach to product mix, professional services, cost-benefit analyses, tax strategies, supply chains, market dominance, strategic alliances, competitive advantage, targets of opportunity, and innovation and the use of technology." She finds that terrorist groups engage in various means of revenue generation motivated by the same logic that drives firms to enlarge their range of services and products. She studies terrorist groups that engage in criminal activities as a way to increase their funds. She notes that "obtaining, maintaining, and expanding access to funding [...] are some of the core concerns for terrorist groups. Just like any business, without the capital needed to operate, terrorist groups cannot continue to maintain and train personnel, obtain weapons, and launch attacks" (Shelley, 2014, p. 178). Without the necessary resources, a terrorist group cannot conduct the attacks it likes to do. Shelley's work identifies the business side of terrorism.

Zelinsky and Shubik (2009) capture the business models of terrorist groups and classify them as hierarchies, franchises, brand strategists, or venture capitals. They derive those different types by focusing on operational characteristics of the terrorist group and on the mode of its resource generation. They differentiate terrorist groups based on their degree of centralization on both dimensions. Zelinsky and Shubik Zelinsky and Shubik (2009) highlight the relationship between the organizational design and the

[6]The groups that survived the longest in his analysis are the Provisional Irish Republican Army (PIRA) and the Palestine Liberation Organization (PLO).

resourcing requirements. Terrorist groups have different degrees of control over resources depending on their organizational structure. This point is developed in chapter 3 of this dissertation. Here it is important to note the theoretical and empirical advantages to systematically conceptualize terrorist groups based on their economic activities.

According to Zelinsky and Shubik (2009) a terrorist group falls in a respective class depending on how it structures its decision-making process and supply of resources. Depending on how the degree of centralization varies on both dimensions, terrorist groups are either hierarchies, franchises, brand strategists, or venture capitals. Hierarchies are centralized in their decision-making process and their resource generation (Zelinsky and Shubik, 2009, p. 3). Hierarchies have one central entity that decides which operations to plan and carry out and the same entity organizes the supply of the necessary resources. This has advantages and disadvantages. Zelinsky and Shubik (2009, p. 3) state that because of this dual centralization hierarchies can undertake long-term projects but also require a high level of bureaucracy to ensure decision-making, since all information and skills are concentrated at the top and need to be communicated through the ranks. They provide several examples: Hezbollah and PIRA both have centralized control over resources and operations.

Venture Capital terrorist groups have decentralized operations but centralized resources. While these groups are financed by a central source they have little control over operations, isolating individual cells of the group. Information and knowledge is distributed and difficult to retain in the overall organization. Zelinsky and Shubik (2009, p. 4) define AQ in the mid-1990s as such a Venture Capital group being financed by the core organization but with the cells being left at their own discretion concerning their operations.

Franchises combine centralized operations with decentralized resources. While franchises are good at disseminating strategic blueprints, the individual cells are left to finance themselves and allocate the resources needed for an attack. Zelinsky and Shubik (2009) do not provide any examples for this type of terrorist group, but some IS related attacks in Europe can be linked to such a Franchise setup. People affiliated with IS coached the attack in Wurzburg by a man attacking people in a regional train in July 2016. However, the attacker was responsible to allocate the resources he needed for the attack. While he was recommended to use a car for an attack similar to the one in Nice just a few days earlier, he opted for an ax and knife because he did not have a drivers license (Garbe and Kaempf, 2016).

Brand type terrorist groups have both decentralized operations and decentralized resources. Those groups rely on ideological self-identification, have no central authority defining a common strategy, they have no institutionalized communication between cells, and every cell is left to allocate their own resources. Zelinsky and Shubik (2009, p. 4) provide the example of the Earth Liberation Front (ELF).

However, it is difficult to talk of an organization when it comes to a brand, since the attacks are merely inspired by the brand that is the ELF. There is no coordination and no coaching. These attacks can also be observed in relation to IS where people who are about to commit a shooting assume allegiance with IS to gain more impact. Oftentimes, this connection consists only of ideological sympathy instead of some tangible connections to members of the group.

This section has discussed relevant issues of defining terrorism and terrorist groups. Many studies only implicitly define terrorist groups as actors that use terrorism. The conceptualization of terrorist groups as economic entities enables a focus on their economic activities that allow them to sustain themselves. It allows focusing on the business rationale of terrorist groups. They can capitalize on political opportunities and economic opportunities. I build on the conceptualizations by Adams (1986), Zelinsky and Shubik (2009), and Shelley (2014), who all devised typologies of terrorist groups as business entities. I extend their research as I focus on how terrorist groups manage to maximize their strategic advantage given a specific environment. I capture the behavior of terrorist groups as a function of available resources.[7] In the following section I discuss the literature relating the behavior of terrorist groups to their resource endowments. I develop my market model of terrorism distinguishing the political and the economic market of terrorism, arguing that the first relates to a terrorist group's willingness to engage in violence, while the second relates to its ability to do so.

2.4 A market model of terrorism

Terrorist groups conduct attacks on civilians in order to promote their political goals. Each attack is the consequence of a terrorist group's *willingness*s and *ability* to carry out an attack.[8] The threat, which a terrorist group poses, therefore, depends on both its motivation and its capability to stage an attack. Both dimensions also affect the intensity of an attack (Cragin and Daly, 2004). Hoffman (1998, p. 157) states that the way terrorist attacks are executed reflects the aims and the motivation of the terrorist group, fits its resources and capabilities and considers the audience(s) the attack should communicate a message to. Figure 2.1 illustrates the logic of my market model of terrorism.

I claim that the motivation and capability of terrorist groups can be explained by borrowing from

[7] This dynamic is also discussed regarding the behavior of other actors (McCarthy and Zald, 1977).

[8] Individual terrorists can also carry out attacks. The extent to which there is a lone attacker that is truly independent from any organization is contentiously discussed in the literature (Gill, 2015). While individuals can carry out attacks, most attackers have been in contact with members of an acknowledged terrorist group or are inspired by terrorist groups' calls to conduct attacks (i.e., Garbe and Kaempf, 2016; BBC, 2016; Spiegel, 2016). Still, it is true that individuals can conduct terrorist attacks completely on their own. The general logic also holds for those people. The threat they pose depends on their willingness and their ability to carry out an attack. In this dissertation the focus rests on intra- and inter-organizational dynamics of terrorist groups and their consequences. Therefore, I focus my attention on the terrorist group instead on individuals.

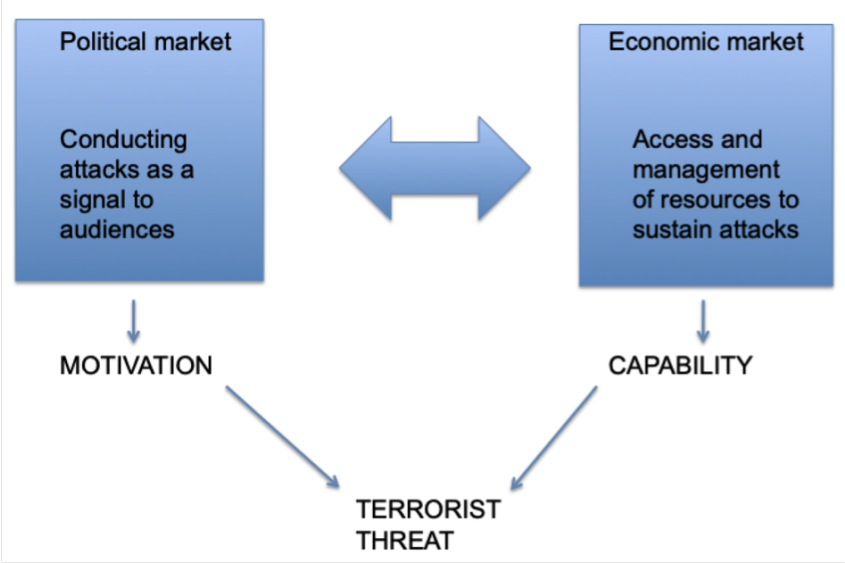

Figure 2.1: A market model of terrorism

theories of trade and market economics. Using these approaches accounts for the fact that terrorist groups do not exist in a vacuum, but constantly interact with their environment.

Terrorist groups have two audiences with whom they openly engage via their actions. Each terrorist group communicates with its target population and with its support population. While it fights the first one, it tries to evoke sympathies and support from the second one.

For their interaction with their audiences, terrorist groups are motivated by various causes (Forest, 2012; Valentino, 2014; Piazza, 2011; Crenshaw, N.d.). Forest (2012) defines such causes to be mobilized by so-called preconditions and triggers. Those preconditions and triggers provide a context in which terrorism is more likely. Terrorists use them to justify their need to use violence in order to pursue their respective goals. Preconditions capture the 'things that are' (Forest, 2012, p. 61). These can be certain grievances, i.e., the perception that something is wrong, or they include so-called facilitators that can provide individuals or organizations with opportunities to engage in terrorist activities (Forest, 2012). While grievances can capture things like inequality or discrimination within a society, a space safe from persecution or the access to weapons can facilitate terrorist groups use of violence. Triggers on the other hand are 'things that happen' (Forest, 2012, p. 61). They are specific actions, policies, or events that enhance the perceived need for action within a particular environment. Those can be, for example, the erosion in the security environment, a sudden regime change, or a coup. Propagandists of terrorist groups seize upon those events to enhance the resonance of their ideology. It is important to note that preconditions and triggers can affect each other. As such, grievances and facilitators that are already present can fortify the effect of the propaganda.

While Forest (2012) discusses the abilities and opportunities of terrorist groups to engage in violent acts, he provides no intuition on how terrorist groups can systematically vary depending on their ability to capitalize on those different preconditions. His discussion remains on factors that motivate individuals and organizations to engage in terrorism. I build on his research and focus not on the willingness to fight but on the ability to do so and, thus, is captured by the motivational pillar of my market model.

While much research focuses on this motivational aspect and the political market of terrorism, terrorist groups also need to mobilize the resources needed to carry out attacks and to pose a significant threat to their opponent. I maintain that terrorist groups need to act on what I call the economic market of terrorism (captured in the economic pillar of my market model). Here they interact with other actors in their environment to exchange resources and trade surplus. Terrorist groups can access resources, which are possessed by other actors. They can access technologies and know-how, which affect their capability to conduct attacks and survive as an organization. The economic market requires maintaining its clandestine features for a terrorist group's operations not to be disrupted and its performance maintained. The political market, however, thrives off the publicity of terrorism and terrorist groups.[9] While the political market influences what a terrorist group wants to do, the economic market affects what a terrorist group can manage to do. This dissertation focuses on the economic market of terrorist.

The success on the political market depends on a terrorist group's success on the economic market. Only when a terrorist group performs well in both markets it poses a viable threat. With their activities on the economic market, terrorist groups can alter their tactical repertoire as a function of accessible resources. Their economic activities influence what they can manage to do, thus, interlinking both markets. Terrorist groups wish to shape the political, social, and economic (Hoffman, 2006) lives of their target population. To achieve changes on the political market, terrorist groups need to be viable actors on the economic market.

Assuming there are terrorist groups that want to carry out attacks, their ability to do so hinges upon their ability to mobilize resources. The process of generating resources depends on external exchange relationships and on internal organizational dynamics. The theoretical and empirical approach of this dissertation combines both dimensions.

This dissertation focuses on the exploration of a terrorist group's capability to conduct an attack. I proceed to describe the intricacies of economic exchange relations of terrorist groups. The characteristics

[9]This is in contrast to organized crime. While terrorism and organized crime both rely on hidden economic transactions between and within organizations, criminal actors do not publicize their activities to mobilize support and boost the level of fear within society. Their violence is immediate, intended for the victim, and not intended to raise awareness to a specific cause. This is not to say that targeted killings by criminal actors do not foster the fear in their direct opponents. In fact, criminals use violence strategically to keep their members in line (Gambetta, 2000). However, this fear effect is restricted to members or benefactors of the crime.

of the economic market provide opportunities and constraints for a terrorist group's behavior as they shapes its ability to access and use resources. They influence the organizational structure of a terrorist group as it needs to adapt its internal governance to the environmental preconditions and they determine the opportunities for terrorist groups to collaborate with each other and become involved in organized crime.

2.4.1 The economic market of terrorism: The behavior of terrorist groups as a function of resources

This section discusses previous research that explores the threat posed by terrorist groups as a function of their resources. Terrorist groups need to carry out attacks that further their objectives to spread fear among the population and to coerce their opponent into concessions. They also need to sustain their organization preferably over an extended period of time. To do that terrorist groups need resources. As James Adams (1986, p. 251) puts it, "After all, terrorists cannot live on idealism alone, and even if their services do come cheap, they need to eat and to buy ammunition for their guns." Understanding how terrorist groups go about in procuring the necessary resources is a significant step in understanding their behavior.

While terrorism research can draw on insightful case studies of terrorist group financing and resourcing more broadly (Gunaratna, 2002; Johnston et al., 2016) as well as on studies of different types of resources to fund terrorist operations (Byman, 2005; Farah, 2004; Horgan and Taylor, 1999, 2003; Jayasekara, 2007), little systematic attention has been paid to the processes of resource allocation of terrorist groups. Studies have analyzed the impact of specific resources on the performance of terrorist groups, such as the existence of sanctuary (Connable and Libicki, 2010), strong leadership (of the Army and Corps, 2007), a compelling ideological narrative (Bin Hassan, 2006), or the probability of procuring specific technical resources, such as weapons of mass destruction (Asal and Rethemeyer, 2008). Jodi Vittori (2011) and Louise Shelley (2014) highlighted the importance to 'follow the money' in order to learn more about the organization and the behavior of terrorist groups. After 9/11 there have been several studies analyzing AQ in great depth (Bergen, 2002; Farah, 2004). Other case studies revolve around PIRA (Adams, 1986; Holland, 1987; Horgan and Taylor, 1999, 2003) and its use of criminal activities and connections to other terrorist groups such as the Colombian FARC. The Palestinian Hamas (Levitt, 2006), the Sri Lankan Liberation Tigers of Tamil Eelam (LTTE) (Jayasekara, 2007), or Hezbollah (Levitt, 2007) have also been studied. While the first two receive substantial Diaspora support, Hezbollah is greatly financed by Iran. Those studies highlight the various funding opportunities and describe the type of activities those terrorist groups conduct to resource their operations. They analyze the

interactions of the terrorist group with other actors in its environment. While those studies rely on the description of individual cases, their findings inform my theoretical framework. They provide extensive insight into the process by which terrorist groups generate revenue and procure resources. They link a terrorist group's activities to their strategies of resourcing and the success or failure of these strategies to a terrorist group's activities. Their strategies depend on internal group-dynamics and external conditions. However, those studies of individual case examples do not develop a general theoretical model of the resource generation process or the effect of resources on the performance of a terrorist group, which is the goal of this dissertation. I argue that understanding patterns of the resourcing process is useful for understanding the behavior of terrorist groups.

Colin Clarke (2015, p. 1) defines the process of terrorist resourcing "as the process of raising, storing and moving funds obtained through legal or illegal means for the purpose of terrorist acts or sustaining the logistical structure of an insurgent organization." While Clarke focuses his argument on monetary resources, this dissertation widens the scope to include the entire range of financial, material, and cognitive resources. Steve Kiser (2005) breaks down this resourcing process in the stages of earning, moving, and storing the money. Both approaches combine external processes of resource acquisition and internal processes of resource allocation. Kiser (2005) applies his framework to the study of AQ, explaining its behavior by the group's ability to acquire and manage resources.

Jodi Vittori (2011) applies the framework by Kiser (2005) of acquisition, storing, and moving to various kinds of tangible and intangible resources. She accounts for the fact that the choice of resourcing strategy does not only depend on the groups' leadership discretion but also on the opportunities provided by the environment of a terrorist group.

Vittori identifies seven categories of terrorist groups based on how terrorist groups acquire, move, and store resources:[10] 1) Lone wolves are individuals who act upon a specific grievance and identify with a particular ideology that is guiding their behavior. They are disconnected from a wider organization and receive little or no external support. Such terrorists are often difficult to distinguish from a person going on a rampage. As such, the person attacking people at a shopping center in Munich in the summer of 2016 was a single person possibly motivated by right-wing ideology (Hoben, 2018). 2) State-sponsored terrorist groups receive almost all their funding from a state sponsor, who then uses the terrorist group to further its own foreign policy objectives. States supporting terrorist groups enlarge their resources (Byman, 2005; Quillen, 2002). Thus, states can have a "force multiplying effect" (Hoffman, 1999). Hezbollah is a terrorist group that is greatly supported by Iran and oftentimes labeled as a proxy organ-

[10]Those are ideal types. One terrorist group might fall into more than one category. While this may blur the boundaries of the categories, it still informs about the capabilities of terrorist groups. Knowing about a terrorist groups resource portfolio is useful to be informed about what behavior to expect.

ization of Iran (Levitt, 2013*a*). 3) Franchises are groups that employ a diversified resourcing strategy. They may still have one or few major sponsors, but they do not rely solely on one strategy but combine multiple ones. PIRA combined multiple sources of income covering both the legal and illegal spectrum (Horgan and Taylor, 1999, 2003). 4) Popularly supported terrorist groups have multiple smaller and dispersed donors, such as Diaspora communities in various countries. PIRA also relied on the support of Diaspora communities, highlighting the fact that a terrorist group can fall into more than one category (Horgan and Taylor, 2003). The Red Army Faction (RAF) also relied greatly on popular support (Vittori, 2011, p. 10). 5) Shell states are terrorist groups that are strong enough to take over the monopoly of violence from the state in a specific region. They can use this territory to exploit it for resources and sanctuary. In the past the Peruvian Shining Path was such a shell state organization (McCormick, 1988). IS also managed to control a significant amount of territory and to exploit the resources to its benefit (Liang, 2015). 6) State sponsoring terrorist groups share the power with a state authority. They have achieved a sufficiently high level of resourcing and capabilities, which urges a state to share its power in exchange of services of the group. In Palestine both Fatah and Hamas provide social services and state like capabilities consolidating their power in the region (Usher, 2006). 7) Transnational corporations are terrorist groups that expertly utilize the globalized economic system for their resourcing purposes. They trade both legal and illegal goods through global channels. Several terrorist groups manage to utilize the globalized economic system to facilitate their resource generation. Examples are Hezbollah (Levitt, 2013*a*,*b*), PIRA (Horgan and Taylor, 1999, 2003), or IS (Liang, 2015; Johnston et al., 2016).

Vittori (2011) notes that over their lifespan terrorist groups can change between the categories. For example, they can start as a lone actor and then receive more popular support over time. Shelley (2014) argues that terrorist groups mix different strategies for maximal profit. The conceptualization of a terrorist group's resourcing process as an institution is an important step forward in developing a systematic classification of terrorist groups based on their resourcing strategy. Also, the focus on resourcing as a multi-step process of external acquisition and internal storing and moving in conjunction with environmental contingencies is a valuable approach. However, the literature so far falls short in explaining why some groups are more apt in moving and storing than others.

Several studies discuss the external support, which a terrorist group can receive. Examples are studies on the support by local communities (Johnston et al., 2016), states (Byman et al., 2001; Byman, 2005; Gerges, 2005; Levitt, 2007; Richardson, 2006), Diasporas (Byman et al., 2001; Levitt, 2007; Richardson, 2006; Smith, 2007), charities and NGOs (Basile, 2004; Mascini, 2006; Smith, 2007), organized criminal groups (Asal, Milward and Schoon, 2015; Metz and Millen, 2004), or other terrorist groups (Asal et al., 2016; Horowitz and Potter, 2014). Those studies assess the connections a terrorist group has to other

actors in its environment, highlighting their importance for the generation of resources. They discuss various types of support, which can be provided by different actors. Their findings indicate that terrorist groups depend on the resources provided by other actors and that they may adjust their performance depending on the available resources.

I argue that what a terrorist group does and what can be observed in the attack is a function of the resources a terrorist group has. I build on the work by Colin Clarke (2015), who analyzes how insurgent groups fund their activities. He identifies them to be engaging in activities that are part of both grey and dark economy (Clarke, 2015, p. 2). The concept of grey economy captures a combination of licit and illicit activities used by terrorist groups for material gain (Clarke, 2015, p. 3). While some activities might be perfectly legal, other aspects of the funding activity are illegal. Oftentimes, the boundaries between legality and illegality are fuzzy, complicating the monitoring by outside entities and challenging law enforcement. Activities that can be grouped into grey economy are funding by Diasporas, donations made through charities and NGOs, fraud such as identity theft, installing legal businesses as front companies for illegal activities and money laundering. Since the legal parts of those activities regularly interact with the illegal parts, they are difficult to detect and counter. As such, people might make honest contributions to charities hoping to help the misfortunate, or people send money to their family members not knowing that the same channels are used by terrorist organizations to move money.

The dark economy captures all those activities that are entirely illegal. Oftentimes those activities involve violence or the threat of violence (Clarke, 2015, p. 8). Those activities include kidnapping for ransom, armed robbery and theft, counterfeiting and smuggling and trafficking operations, extracting natural resources, or extortion. Some research suggests that terrorist groups lose their ideological purpose the more they engage in criminal funding activities (Cornell, 2007). However, various examples suggest otherwise. PIRA has engaged in various criminal activities (Horgan and Taylor, 2003) ranging from counterfeiting, smuggling, and money laundering to armed robbery and theft. They did not lose their political purpose, however, enabling them to rely on ample popular support. This allowed them to rely also on continued Diaspora funding.

Weinstein (2007) investigates how access to economic and social resources affects insurgents' aptitude of attacking civilians, thereby focusing on the effect of specific resource endowments on the behavior of groups using violence. Weinstein's work is influenced by the literature on social movements, which finds that those movements that are able to mobilize resources are more likely to succeed (Freeman, 1979; McCarthy and Zald, 1977). Resources are important for a group being able to achieve its goals (Alimi, 2003). Boyns and Ballard (2004) provide one of the first studies that links resource constraints

to the behavior of terrorist groups. Enders and Sandler (2005) find that a terrorist group's resources influence both the scale and the frequency of attacks. Oots (1986) claims that small and medium sized terrorist groups are likely to be deadlier in a specific attack. He argues that large groups require a substantial amount of resources to maintain the organization. Those resources cannot be allocated towards a particular attack.

In chapter 3 I develop a more detailed model of the resourcing process. This also includes a classification of resources that can be procured in exchange relationships. I argue that the resources need to be managed efficiently in order to have an effect on a terrorist groups behavior. I discuss the challenges to cooperting between terrorist groups that might hamper the resource exchange between them. After that I focus on the organizational structure as one feature of an organization that shapes the efficiency of resource management.

2.4.2 The challenges to cooperation between terrorist groups

While the previous section conceptualizes cooperation between terrorist groups and elaborates on the benefits of cooperation, terrorist groups that work together are a rare event. Usually they work alone. Asal et al. (2016) argue that cooperation between terrorist groups is rare, because the costs are high due to "(a) the expenditure of resources involved when groups with different goals had to negotiate terms of collaboration; (b) personality-based and ideological disagreements among the parties that would make working in a coalition difficult; and (c) the increased security risks from a joint action, since the total number of actors with knowledge of operations has increased." Kinsella (2008, p. 3) similarly argues that cooperation between terrorist groups involves high transaction costs due to high levels of uncertainty and incomplete information. Both statements highlight the danger and the risks for a terrorist group that cooperates with another terrorist group. Additionally, they state that establishing and maintaining cooperation requires resources. Establishing cooperative relationships between terrorist groups includes risks. Those risks stem from the self-interest of the actors and their propensity for opportunistic behavior (Williamson, 1981). It is rational for a terrorist group to try and maximize its own benefits at the cost of the partner. While states or firms draw contracts that include punishments for such behavior, terrorist groups usually do not base their cooperative relationship on a written and binding contract. In addition, terrorist groups face constant pressure from counterterrorism initiatives threatening their operational capabilities and their existence (Bacon, 2014; Bapat and Bond, 2012; Moghadam, 2017; Oots, 1986). External pressure on the organization and internal dynamics produce challenges to cooperation, which I will elaborate in the following paragraphs.

Bargaining theory explains that making credible commitments is a crucial requirement for cooper-

ation (Fearon, 1998). This requires terrorist groups to signal their partner the intention of honoring promises and obligations (Bacon, 2014; Bapat and Bond, 2012). In the legal context of states and business corporations working together, institutions ensure that both parties respect the rules of cooperation. However, in the illicit realm of terrorist group cooperation no such regulations exist to enforce commitment and punish non-compliance (Bacon, 2013; Karmon, 2005; Moghadam, 2017). This leads to mutual distrust, opportunistic behavior, secretive operations and an overall lack of transparency (Bapat and Bond, 2012; Karmon, 2005). It is difficult to establish trust between cooperation partners without mechanisms to ensure accountability. Thus, both groups have the incentive to shirk from their commitment (Moghadam, 2017; Shapiro, N.d.). The lack of trust can also increase the likelihood of misunderstandings between two terrorist groups. Considering that the terrorist groups might have a different vision or strategy, the interaction might be prone to misunderstandings (Shapiro, N.d.). This is particularly problematic for terrorist groups, because any wrong decision and deviation from a plan can compromise the operation as well as the terrorist group itself. Given the hypothetical scenario of operational cells of two terrorist groups working together to carry out an attack, but with misunderstanding and distrust between them, the operatives are prone to a behavior that might endanger the best plans.

Whenever one terrorist group cooperates with another to conduct a joint attack they lose independence. As in any cooperative arrangement a terrorist group may be forced to reach an operational or strategic compromise with their partner. This decreased operational autonomy might stir the terrorist group to become distracted or deterred from their primary objective and to become involved in activities that might not be conducive to their overall goal (Bacon, 2013).

Deterring from one's own goal and strategy to accommodate a cooperation partner can have a two-fold consequence for a terrorist group. First, it can lose its own support base and splinter into various factions, increasing dissent within the group and weakening the terrorist group as a whole. From the perspective of a partnering group, such a group becomes a less attractive ally, because the operational strength of the overall group and their reliability and trustworthiness decrease.[11] This was the case for the Egyptian Islamic Jihad (EIJ) allying with AQ. While the EIJ was focusing to fight their local government in the name of Jihad, AQ followed the strategy of fighting the West. While the EIJ wanted to restrain their activities to fight the 'near' enemy, AQ wants to fight the 'far' enemy. This led to discontent within the EIJ's constituency followed by organizational splintering. Those that did not want to plead allegiance to AQ favored an independent though smaller group fighting to oppose the Egyptian government (Sageman, 2004).

[11] Splintering can also result in smaller but more cohesive entities. While they might be clear on the strategic direction of their activities, they might be weakened in terms of their overall capacities.

Second, it may affect the partner selection in the first place. Considering a strong in-group identity and loyalty between the individual members of the group, it is difficult to generate trust to members of other groups. This constrains partner selection.[12] Thus, cooperation can decrease a terrorist group's operational autonomy, increase the risk of defection and splintering, and thus increase the group's vulnerability.

Vulnerability increases also through the creation of new enemies and counter-terrorism pressure (Bacon, 2013). Cooperation requires coordination and communication. This opens new opportunities for counter-terrorism authorities to intercept messages or apprehend operatives. The more a terrorist group relies on communication technology to interact with their partner the higher are the risks of interception. Modern communication technologies allow terrorist groups to coordinate their activities over long distances providing them with valuable operational capabilities. But they also increase the risks. Counter-terrorism authorities have the ability to tap into those transmissions and disrupt the organization and their activities. Another risk stems from the higher number of people privy to details of a terrorist group's activities. This increases the possibility of security breaches (Oots, 1986). Forging an alliance with AQ put the EIJ on the radar of the U.S. and their global war on terror. The EIJ was considered to be a threat to U.S. interests. Before the alliance of AQ, EIJ was mainly facing Egyptian authorities.

Cooperation between terrorist groups provokes authorities and other terrorist group competitors. If a terrorist group pledges allegiance to another group, disenfranchised factions might feel threatened or sidelined. They need to uphold their legitimacy in the eyes of their constituency and may decide to fight the competing terrorist group. In 2014 Ansar Bayt al-Maqdis (ABM), an Egyptian/Palestinian organization operating in Gaza and the Sinai Peninsula became an official province of IS. As many supporters of ABM were still set to follow the ideology of AQ, they split, formed independent organizations and started to fight for supporters in the region (Stewart, 2016).

Cooperation between terrorist groups includes logistical costs. Every cooperative relationship requires efforts to establish communication channels, opportunities to exchange material resources, or for operatives to meet for training and planning. The higher the obstacles for establishing those things the higher the logistical costs. As such, geographical proximity makes cooperation easier, whereas language barriers make cooperation more difficult. Obstacles can include geographical or cultural boundaries, but they can also include counter-terrorism pressure.

The reasoning presented above illustrates that cooperation can have a destabilizing effect on the

[12] This is the main argument of theories promoting ideology as a predictor of cooperation between terrorist groups. Several scholars find support for this causal relationship (Karmon, 2005; Horowitz and Potter, 2014; Asal, Ackerman and Rethemeyer, 2012). While ideologies may provide some heuristics to establish trust, one-off cooperation to exchange operational resources may not rely on them.

organization, threatening its survival and success (Koza and Lewin, 1998). However, while cooperation between terrorist groups is risky, the amount of cooperative relationships observable suggests that the benefits of cooperation outweigh its costs at a non-trivial frequency. Whereas multiple obstacles might challenge long-term alliances, one-off cooperation in joint events is less risky. I argue that terrorist groups enter those engagements due to opportunity and expediency to supplement their existing resources and to boost their operational capability.

2.5 Organizational structure in terrorism research

In this dissertation I focus on the organizational structure as a feature of terrorist groups that affects their ability to manage resources. Before I detail this mechanism in section 3.4, this section provides a synopsis of previous work acknowledging the importance of focusing on the organizational structure in terrorism research.

The mere existence of resources is not enough to carry out a terrorist attack. It is important to consider which factors shape a terrorist group's ability to use the respective resources. I argue that the organizational structure of a terrorist group is a crucial, yet understudied, factor influencing a terrorist group's resourcing process. Organizational features matter for the resourcing process as they determine the terrorist group's ability to access certain resources in the first place, and also how well the groups can use those resources, i.e., how well they can "acquire, store, and move resources" (Vittori, 2011, p. 26). Identifying needs of a terrorist group, the sources through which these needs are met, and the organizational dynamic of putting those resources to work should be the logical first step in understanding the behavior of terrorist groups.

The organizational structure of terrorist groups has been discussed in the literature with increasing interest in the recent years. The acknowledgement of the organizational structure as one factor that influences the behavior of terrorist groups builds on the organizational approach explaining terrorism by Martha Crenshaw (N.d.). Crenshaw's approach suggests that terrorist groups are strengthened or weakened by their own internal dynamics (Crenshaw, 2011, p. 74). She builds on work viewing social movements in terms of their organizational cooperation and competition (Zald and McCarthy, 1980). The study of organizational structure of terrorist groups can benefit from the comparison with other types of organizations. Insights on terrorist groups can be informed by studies on insurgency groups (Johnston, 2008) or non-violent protest movements or non-governmental organizations (Kahler, 2009).

Prior research additionally highlights the benefits of comparing terrorist groups to other types of

illegal organized activities. Dugan and Gibbs (2009) compare terrorist and corporate crime organizations to derive recommendations on how to better control each. Both types of organizations need to survive in competitive and hostile environments. They find that both organizations adopt complex organizational structures over time to survive.

The organizational structure of terrorist groups has been the explanatory variable in various studies, often relating it to the performance of the groups (Abrahms and Potter, 2015; Heger, Jung and Wong, 2012). They find that the organizational structure shapes the target type as well as the lethality of attacks. They find that centralized groups are more likely to attack civilians or to conduct more lethal attacks. Other studies find that terrorist groups adjust their structure and activities in response to internal and external pressure (Krebs, 2002; Sageman, 2004; Xu and Chen, 2008). Their results suggest that terrorist groups isolate their members from each other to minimize the risk of failure if some members are detected. Using the example of the 9/11 attacks on the World Trade Center and the Pentagon by AQ, they provide evidence that the teams carrying out the attacks were kept separate until the last minute. The pilots did not know who was trained to take over the plane. Every attacker was trained with a specific skill-set. Those who learnt to pilot a plane were trained independently from the other attackers. This is exactly what Osama bin Laden intended (Michael and Wahba, 2004). Group structure is used as a proxy for leadership control in various contexts (Krahmann, 2003; Williamson, 1975), including militant groups (Abrahms and Potter, 2015; Arquilla and Karasik, 1999; Chai, 1993; Stepanova, 2008). Focusing on leadership control as the central comparative attribute, it is expected that more centralized groups delegate less autonomy to subordinates (Galbraith, 1973; Pugh and Hickson, 1976). Other studies analyze organizational factors determining network productivity and durability (Perliger, 2014), and find that hierarchies are better at the production of violence than decentralized networks (Abrahms and Potter, 2015; Heger, Jung and Wong, 2012). Focusing more on the network perspective, the network structure varies depending on the time to the attack (Helfstein and Wright, 2011; Morselli, Giguere and Petit, 2007; Xu and Chen, 2008) and they decentralize in order to protect themselves from disruption (Everton, 2012). Few longitudinal studies confirm this effect (Carley, Lee and Krackhaardt, 2002; Everton and Cunningham, 2015).

Several studies analyze the need to remain clandestine to prevent disruption. They suggest that covertly operating organizations need to maintain the balance between organizational persistence and operational capacity (Asal, Milward and Schoon, 2015; Bakker, Raab and Milward, 2012; Stern, 2003). This balancing act has been labelled as the multi-objective optimization problem of terrorist groups (Lindelauf, Borm and Hamers, 2009). Simmel (1906) argues that secret societies have to organize to conceal themselves and to protect their members from detection. Similarly, Erickson (1981) shows that

secret organizations organize themselves to maximize security as a function of risk. Baker and Faulkner (1993) follow that reasoning, showing that conspiracies prefer concealment to efficiency by adopting decentralized structures to protect the core members of the organization. Decentralized organizations are harder to detect and disrupt since sparse connections limit their members' exposure. Whereas these studies focus on maximizing secrecy, others highlight the need to maintain secrecy while ensuring efficient operations (McCormick and Owen, 2000). The way terrorist groups manage to work out this balancing act influences their resilience to disruption (Carley, Lee and Krackhaardt, 2002; Farley, 2003; Kinsella, 2008; Koschade, 2006; Magouirk, Atran and Sageman, 2008; Sparrow, 1991).[13] While a decentralized network structure increases secrecy, a bureaucratic hierarchical structure is more efficient in planning and conducting operations (Shapiro, 2005). Shapiro (2007) provides an insightful perspective on the internal dynamics of terrorist groups. Using principal-agent theory he argues that efficient allocation of resources needs middlemen between individual financiers and the leadership of a terrorist group. He postulates that terrorist groups need to implement strategies of auditing or punishment to decrease vulnerabilities and inefficiencies stemming from intricacies of the individual interactions between principal and agent.

Laitin and Shapiro (2008, p. 223) find that terrorist groups move away from centralized control toward a decentralized and flatter structure. This trend is most commonly attributed to the pressures put on terrorist groups by the Global War on Terrorism. This finding is at odds with the pattern observed by Shapiro (2005) that historically radical groups increased central control. According to the management literature, organizations add complexity, i.e., the "degree of spread and segmentation in an organizational structure" (McKendall and Wagner III., 1997, p. 627), which allows them to grow functionally and geographically. Thus, they adjust to a changing environment (Chandler, 1962). Also, novel communication technology enables terrorist groups to connect and coordinate their activities over a larger geographical span. It allows them to coordinate across a disconnected territory. Members of core IS located in Syria can communicate with people located in Europe, coordinating their activities. This has been the case for Sayfullo Saipov, who committed and attack in New York in the name of IS on October 31 2017 (Callimachi, 2017).

This discussion highlights the challenges of conceptualizing organizational structure systematically. In most organizations there is some degree of centralization. The classification of terrorist groups as centralized or decentralized may also depend on the level of analysis. For example, an individual member might have to report to someone else. But overall, this hierarchy might only be present within a small cell, which is operating independently from any control by a central authority. In that case, the terrorist

[13] Network disruption can be random or targeted. Different organizational structures favor different disruption strategies.

group is showing high levels of decentralization, while the individual member might still experience a high level of hierarchy.

Chapter 3

The economic market of terrorism – a theory of resource acquisition and resource allocation

Scholars and practitioners recognize terrorist groups' acquisition and allocation of resources as a multi-step process (i.e. Clarke, 2015; Kiser, 2005; Vittori, 2011; Wittig, 2011). The U.S. government, for example, conceptualizes the resourcing process in three steps: First, terrorist groups acquire and store the resources; second, they move the resources to the cell that carries out the operations; and third, the resources are used in the attack (Wittig, 2011). This process can be fast or slow, its steps can occur simultaneously or over large time spans in between. These models depict the operational life cycle of terrorism, as they exemplify the processes a terrorist group engages in to generate revenue to use in attacks (Wittig, 2011). Those models view the terrorist attack as the consequence of a terrorist group's ability to translate resources into valuable supplies needed to produce attacks. They capture the context in which a terrorist group interacts with other actors, from which they extract material, financial, and cognitive support. They also depict the stages of the resourcing process from the initial acquisition of resources to their final use in the attack.

Each terrorist attack has different operational demands that have to be met by the terrorist group's successful management and control of the supply of resources (Rudner, 2006). In this dissertation, I show that terrorist groups interact with other actors in their environment to exchange resources. To complete the process of resourcing, terrorist groups need to work with the resources within their organization. I conceptualize this as a two-step resourcing process, with acquisition and allocation of resources as the two steps. Acquisition captures the procurement of resources from a terrorist group's environment and

allocation the processing of resources within the terrorist group. I adopt the conceptualization of the stage-like models exemplified above. In contrast to those models, I dichotomize the resourcing process in those resourcing activities that occur outside organizational boundaries and those activities that occur within an organization. As only limited information about these processes is available, this specification is advantageous as it simplifies the theorized model.

The acquisition of resources captures all activities a terrorist group undertakes in order to access financial, material, or cognitive resources from other actors. It includes a process of transferring resources across organizational boundaries. A terrorist group requires external resources where it needs specific resources to complement its own. That way terrorist groups can enhance their tactical repertoire and performance. Increasing resources allows the terrorist group to act more freely as it is able to match its goals with its capabilities.[1] Relating back to the threat equation and the two markets outlined in the previous section, terrorist groups that have the resources to match their political motivation are able to sustain a more credible threat.

The allocation of resources captures many diverse tasks a terrorist group has to complete in order to carry out a successful attack. It needs to assign available resources to specific tasks. The goal is to use its resources efficiently, that is to increase the utility gained from the resources, while minimizing the loss of resources and other related costs. A terrorist group that organizes its resource management efficiently is likely to outperform terrorist groups, which are disadvantaged in terms of resource management. I show that whether a terrorist group can accomplish the task of efficient resource management depends on its organizational structure. By this logic, I explain the variation in terrorist groups' behavior by the variation 1) in their exchange relationships, and 2) in their internal organization.

Next, I explore terrorist groups as organizations. Understanding organizational dynamics is important to study how terrorist groups interact with their environment and what consequences such interaction have. It also is the prerequisite of studying dynamics of resource allocation within the terrorist group.

3.1 Terrorist groups as organizations

The unit of analysis in this dissertation is the terrorist group. In this dissertation I conceptualize a terrorist group as an organization, "in which groups and individuals with varying interests and preferences come together and engage in exchange" (Pfeffer and Salancik, 1978, p. 26). This definition of an organization

[1] It is important to note that this correlation is relevant only for those kinds of terrorist attacks, in which resources are used that are not commonly available and ready for everybody to use. Some attacks require only minimal resources that are accessible to anyone. For example, an attacker can use a kitchen knife to stab people on the street, or someone can use a car to drive into a group of people on the sidewalk. Those scope conditions refrain my theoretical model to be applicable to those cases of terrorism that requires more resources than just widely accessible items.

combines three aspects that require further elaboration. First, an organization consists of individuals, who are a member of this organization. However, individual members can form a sub-group that is also part of the organization. Such groups are often formed around functional tasks or inter-personal relationships. In a terrorist group a functional task can be a specific operational unit carrying out attacks. It can be a group of members responsible for technological developments such as building bombs or acquiring funds. Sub-groups can emerge due to inter-personal bonds, such as friendships or kinship. Terrorist groups often rely on recruits that join the organization through their social network of ties with friends and family (Sageman, 2004). Those ties can persist within and across functional sub-groups.

Second, the definition highlights the varying interests and preferences of members. People join a terrorist group for various reasons (McCauley and Moskalenko, 2008). While preferences can diverge, I assume that all members of the terrorist group pursue the same overall political goals. Inconsistent preferences and intra-organizational power-relations can affect the behavior of the terrorist group. I acknowledge these dynamics. However, I assume those not to be conflicting with the overall objective of the terrorist group.

Lastly, the definition includes the notion of exchange. Exchange happens within the organization and with other organizations. Focusing on the organization helps to explain structural and procedural features within the organization. It emphasizes the distribution of power, tasks and communication channels that characterize operational routines within an organization (Scott and Davis, 2014, p. 18). It also helps to examine the interdependencies of various organizations (DiMaggio and Powell, 1983; Laumann and Knoke, 1987) and the organization's interaction with the environment more generally (Hannan and Freeman, 1989; Pugh and Hickson, 1976). While some researchers distinguish between exchange processes within and outside an organization, both approaches apply a macro perspective on organizations, rather than a micro perspective that focuses on the individual (Scott and Davis, 2014, p. 18).

Approaches that consider an organization's interaction with the environment rely on the underlying assumption of organizations being 'open systems' (Katz and Kahn, 1966). Such systems rely on the flow of personnel, material resources, and information from the outside (Scott and Davis, 2014, p. 31). In an open system an organization's members are assumed to have multiple loyalties and identities, rendering the purposeful goal of the organization a result of constant negotiation (Scott and Davis, 2014, p. 31). To sustain an organization, it is necessary to create emotional ties among the members to form or reform cooperative relationships among them (Scott and Davis, 2014, p. 31). An organization is not sealed off from external influences. Individual members of an organization can have connections to the environment enabling the access to resources. Open system theorists have highlighted the "the ability

of the organization (...) to exploit its environment in the acquisition of scarce and valued resources" (Yuchtman and Seashore, 1967, p. 898). They promote the importance of an organization's adaptability and flexibility to survive in different environments. Those are paramount criteria for terrorist groups in the light of dynamic challenges and opportunities in their environment.

Ties between members of an organization and entities in the environment can be very important in acquiring resources and maintaining support. Research has identified ties to the criminal milieu (Basra, Neumann and Brunner, 2016), to the local population (Bhattacharya, 2017), or Diaspora movement (Horgan and Taylor, 1999) to be important providers of resources. Those inter-personal ties lay at the core of all inter-organizational exchange relationships. However, for the sake of analytic rigor, I focus on the interaction of the terrorist group with its environment on the organizational level rather than on the individual level. This approach discounts individual motivations. The clandestine identity of people participating in terrorist groups poses insurmountable challenges for researchers. Assuming that members of a terrorist group share similar interests and a political purpose, the organization reflects those interests in observable strategies and tactics. The organizational level of analysis illuminates terrorist groups' interactions with other organizations and the environment in general. Terrorist groups do not exist in a vacuum. Their behavior and internal dynamics are affected by their contextual conditions. Examining such terrorist group-environment relations is possible when focusing on the organization as the unit of analysis. Conceptualizing terrorist groups as organizations allows focusing on both inter- and intra-organizational relationships and how those affect the behavior of terrorist groups.

3.2 The performance of terrorist groups as a function of resources

To develop my argument I build on research in the field of strategic management and apply its findings to terrorist groups. While terrorist groups face different challenges with regard to their economic behavior, they still rely on resource endowments to stay competitive in the industry of terrorism. The industry of terrorism includes all actors that are involved in carrying out terrorist attacks.[2] Thus, economic theories can help to explain the behavior of terrorist groups. I provide a synopsis of the strategic management literature. This literature highlights the relevance of a firm's resources for explaining its performance and competitive advantage. I translate their findings to formulate a resource-based theory of terrorist groups. The resource-based view of the firm focuses on the resource endowments of a firm, arguing that it is the heterogeneity in those resources that determine a firm's competitiveness (Barney, 1991; Peteraf, 1993). However, this approach only partly explains the resource acquisition in alliances. Therefore, I

[2] Aside from terrorist groups, such actors can, for example, include criminals and black market entrepreneurs, individual supporters, violent non-state actors, or governments.

expand the research focus on the organization's interaction with other actors in its environment. I discuss resource-dependence theory (RDT) (Pfeffer and Salancik, 1978) and how it applies to the behavior of terrorist groups. Dyer and Singh (1998) focus on relational resources that originate in those exchange relationships. Such resources gain value through the exchange. As a consequence, firms can achieve a higher profit in a relationship that they could have not achieved individually. The relational approach draws on concepts stemming from social network theory, which emphasizes the importance of external ties instead of only focusing on actor attributes. These ties transfer all kinds of resources, which influence an actor's behavior. By studying those networks, researchers can relate their structural attributes to the performance of a single actor (Wasserman and Faust, 1994).

3.2.1 Conceptualizing the performance of terrorist groups

The performance of terrorist groups has been studied frequently, its conceptualization, however, remains rather ambiguous. The performance of a terrorist group is often conceptualized as its organizational and operational capability (Asal and Rethemeyer, 2008; Horowitz and Potter, 2014; Phillips, 2013; Young and Dugan, 2014). Several authors have examined the role of terrorist groups' capabilities and their effect on attack features (Cragin and Daly, 2004; Jackson et al., 2005; Jackson and Frelinger, 2009). Each terrorist group has to complete a plethora of functions to maintain its organizational survival but also to ensure sustained operations.

Organizational and operational capabilities differ from each other. Organizational capabilities include a terrorist group's ability to uphold organizational mechanisms to guarantee the survival of the group as much as more specific abilities, such as the coordination and planning of attacks. Its delimitation from operational capabilities is sometimes vague and oftentimes not intended. Operational capabilities are a terrorist group's ability to produce attacks defined as the "threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (LaFree and Dugan, 2007, p. 184). Previous work sometimes uses the terms of operational and organizational capabilities interchangeable bypassing a clear and unambiguous definition (Young and Dugan, 2014). I follow this practice arguing that while there might be a difference between organizational and operational capabilities, by combining them theoretically and analytically, a terrorist groups performance can be better evaluated comprehensively. I proceed to use organizational capability and operational capability interchangeably. I define capabilities as those abilities and functions that a terrorist group has to possess and fulfill in order to carry out successful operations and maintain its organization.

Previous literature highlights the multiple dimensions of a terrorist group's operational capability.

Those studies commonly find the operational capability to be reflected in the intensity and complexity of the attack. They analyze the survival of terrorist groups (e.g., Blomberg, Gaibulloev and Sandler, 2011; Carter, 2012; Cronin, 2006; Phillips, 2013; Young and Dugan, 2014), the lethality of a terrorist group's attacks (Asal and Rethemeyer, 2008; Horowitz and Potter, 2014), or the use of specific weapon types (Asal, Ackerman and Rethemeyer, 2012). Phillips (2013, p. 1) argues that terrorist groups that have fewer operational capabilities and lack the ability to generate more resources are more likely to fail either through internal dissolution or counter-terrorism pressure.

One of the most common measures to capture the severity of terrorist attacks is a count of the casualties per attack (Asal and Rethemeyer, 2008; Horowitz and Potter, 2014). While several terrorist groups have the ability to carry out small-scale attacks, the ability to kill or injure many people at once indicates a more resourceful terrorist organization. Another possibility to account for the varying operational capability is to include the number of annual attacks. Terrorist groups that are capable of carrying out attacks at a higher frequency than other groups need to have the resources to sustain such a high-frequency campaign (Clauset and Gleditsch, 2012).

Terrorist attacks can also vary in the tactic employed. Terrorist groups can employ a variety of tactics, which include suicide bombings, attacks using some kind of explosive, shootings, or hijackings. While a terrorist group needs specific knowledge in order to use a specific tactic, it is difficult to establish a comprehensive and mutually exclusive rank ordering of capability based on these tactics. Young and Dugan (2014, p. 9) propose to assess a terrorist group's operational capability with their ability to mix different kinds of tactics. Employing a variety of tactics implies not only that the terrorist group possesses the knowledge to do so, but also that it has access to the necessary weaponry and other material resources that may be needed to use different tactics.

Young and Dugan (2014, p. 9) further suggest that the ability to carry out transnational attacks carries information about the operational capability of a terrorist group. Their assumption is that a terrorist attack that transcends national borders is more difficult to carry out and more resource-intensive implying a greater operational capability. Furthermore, terrorist attacks vary in their target selection (Jackson and Frelinger, 2009). Depending on the defensive infrastructure surrounding a target, the selection may also be constrained by the resources of the group. This does not mean that attacking a soft target cannot be a strategic decision. The distinction made here is to assess possible tactical considerations based on their opportunities. As with other tactical decisions, a terrorist group does not only need to have the material resources to carry out the attack, but also the cognitive resources how to penetrate security perimeters.

Frisch (2012) suggests assessing the percentage of successful attacks as an indicator of a terrorist

group's capability. A terrorist group that has few failed attacks suggests an organization in the background that is proficient at matching their activities to the cognitive and material resources. It also manages to plan and coordinate the attack well enough for it to succeed. Related to this is the suggestion of focusing on the number of attackers per incident (Frisch, 2012). This can also imply the presence of coordinative capacity within the organization. A terrorist group that uses multiple attackers has the logistical infrastructure in place to ensure communication with the attackers and the material supply of those who carry out the attack. An attack with multiple attackers can either be of more than one attacker at one location at one time, or it can include simultaneous attacks at different locations but coordinated.

Resources that are available to a terrorist group have an effect on a terrorist group's ability to perform specific types of attacks. By consequence, the attack itself allows researchers to draw inferences from the observable qualities of the attack to the capabilities of terrorist groups and their available resources. Since terrorist groups operate clandestinely, we know very little about their everyday proceedings and we usually only observe their attacks. By this logic, their ability of *how often* they can conduct an attack, *whom* they attack and *how* they can carry out their attacks is influenced by their resources. Terrorist groups use the resources that are available to them in an attack as a terrorist group is aiming to inflict as much damage on the target population and the opponent government as possible.

My argument follows the common conceptualization of a terrorist group being the weaker actor in conflict with a stronger opponent. Being the weaker actor in a conflict, terrorist groups need to rely on the opportunities they have. This implies that the optimal course of action might not be a viable option. Freedman (2007, p. 324) supports this perspective stating that, a "common tendency of groups in weak strategic positions is to choose tactics that are geared to their capabilities rather than their ultimate objective." Evidence shows that terrorist groups do not always choose the optimal course of action, but that they are constrained by their material and cognitive limitations (Crenshaw, 1990, p. 13-15). This may be due to the fact that they do not have access to the material or cognitive resources needed to carry out a specific attack at a specific time against a specific target, but also due to the fact that they lack the capacities to assess the given strategic situation and respond accordingly (Simon, 1982).

I assume terrorist groups use the resources that are available to them instead of storing them for the future since their attacks are meant to communicate a clear message to their audiences. An attack signals the terrorist group's ability and willingness to inflict harm (Kydd and Walter, 2006). Kydd and Walter (2006) claim that terrorist groups employ a strategy of costly signaling to communicate their seriousness to their opponent and constituencies to increase their coercive capacities. This urges them to use the resources available to them to increase their coercive capacity.[3] I expect that the available resources of

[3]Terrorist groups also need resources to maintain their organization. Any extra resources can go towards the attack. Of

a terrorist group influence the group's operational capability. Hence, I expect that the characteristics of a terrorist group's attack reflect the group's resources.

3.2.2 Previous definitions of resources

The resource-based view is a theoretical approach explaining how different resource endowments underlie the performance of firms. Originating in the strategic management literature, it argues that those firms with better resource endowments can advance their competitive advantage (Barney, 1991; Peteraf, 1993). Research studying violent actors implicitly assumes a similar logic as outlined above (Staniland, 2012; Weinstein, 2007). Resources, such as weapons, money or other liquefiable assets, are the lifelines of terrorist groups. Terrorist groups need resources to "sustain themselves, conduct operations, and live to fight another day" (Vittori, 2011, p. 1). Without funding and material assets they cannot achieve their vision. I conceptualize terrorist groups as economic entities. This allows me to build on the strategic management literature and explicitly use its concepts. Thereby, I can 1) classify resources in a way that is theoretically and empirically useful, and 2) identify potential mechanisms how resources affect terrorist groups' behavior.

Wernerfelt (1984, p. 172) defines resources as "tangible and intangible assets which are tied semi-permanently to the firm." Barney (1991, p. 101) ties resources to their importance for the firm classifying them as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by the firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness." Amit and Schoemaker (1993, p. 35) define resources as "stocks of available factors that are owned or controlled by the firm." Common to those definitions of resources is the assumption of proprietary. While the above cited definitions of resources include all types of assets, Makadok (2001, p. 389) distinguishes between resources and capabilities, stating that capabilities are "a special type of resource, specifically and organizationally embedded non-transferable firm-specific resource whose purpose is to improve the productivity of the other resources possessed by the firm." This highlights the notion that resources within one organization are not independent from each other but ideally interact to increase the overall value (Amit and Schoemaker, 1993). For example, a terrorist group having a clear ideological narrative impacts the number of new recruits or supporters, affecting access to money, weapons, or training.

According to Astley and Sachdeva (1984) resources vary in a) how difficult they are to obtain, and b) how critical they are to the functioning of the organization. Vittori (2011, p. 25) claims that terrorist

course, a terrorist group can inflict major harm with little resources as can be seen by attacks of supporters of IS, in which they use cars as weapons.

groups need resources that are 1) simple and do not require too much expertise to access and exploit; 2) provide security from discovery or confiscation by the law or others who wish to harm the terrorist group; and 3) are available in large amounts without the need to expend too much effort to attain them. Freeman (2011) notes that terrorist groups need to consider six aspects when browsing the market for resources. First, the quantities of resources that can be acquired are important. More resources allow the terrorist group to operate with greater flexibility. Second, the legitimacy of the sources is of high relevance when it comes to a business partner. Terrorist groups have a specific clientele of supporters that might not accept some sources. This is an argument often made in the context of the collaboration with organized crime, since the economic motivation of the latter is perceived to be irreconcilable with the political aspirations of terrorist groups. Terrorist groups often avoid engaging in drug trafficking for that reason (Freeman, 2011, p. 463). Third, the operational security must be upheld. The constant threat of disruption demands measures that ensure the secrecy of the operation. If a terrorist group does not manage to keep its resource exchange hidden from law enforcement's counter-measures, it jeopardizes not only its resource flow, but also its organizational survival. The survival can be threatened by the lack of resources needed to sustain the organization, but also by the arrest of crucial members. Williams (2008) points out that it can be dangerous for terrorist groups to rely on organized crime, whose members he finds to be easier to turn. This can hamper the seamless administration of tasks and threatens the secret identities of other members. Fourth, it matters how reliable the source is in delivering resources. A source that is unpredictable can have existential consequences. If a terrorist group cannot rely on the expected supply of resources, it may be unable to carry out a planned attack or uphold its organization. Whether or not a terrorist group has access to reliable resources can depend, for example, on its geographical location. FARC or the Kurdistan Workers' Party (PKK), for example, benefit from their access to the drug trafficking market (Eccarius-Kelly, 2012). Fifth, terrorist groups want to be able to control or influence the source or the mechanism of delivery. A terrorist group might prefer to do business with a centralized organization, as it is able to know who is in charge. The source and the exchange mechanisms are more reliable in those instances. Finally, the simplicity of the whole transaction process is relevant in order to keep the transaction costs low and decrease the chances of error. Geographical proximity can decrease the logistical complexity. This can also be achieved relying on resources that either require no specific skill-set to handle, or for which the skilled personnel is available.

The classifications of Vittori (2011) and Freeman (2011) further differentiate Astley and Sachdeva's (1984) typology of resources. Astley and Sachdeva (1984) recognize the importance of specific features of the resource itself, and highlight that resources vary in how easily they can be transferred from their

point of origin to the terrorist group. However, it falls short of detailing the transfer mechanisms and the features of resources that allow them to be moved between actors. I build on the work by Vittori (2011) and Freeman (2011) and provide a more fine-grained typology of resources that captures their transferability.

I distinguish resources based on their tradability. Before I elaborate what tradability entails, I discuss the types of resources that terrorist groups need to sustain their operations. Previous terrorism literature, oftentimes, does not explicitly list the required resources (Asal and Rethemeyer, 2008; Horowitz and Potter, 2014; Phillips, 2013), or focus on only specific resources, such as weapons of mass destruction (Asal, Ackerman and Rethemeyer, 2012). Some researchers have arrived at classifications of resources that further the scientific debate and practical countermeasures alike. I discuss them in the following paragraphs (Byman, 2005; Clarke, 2015; Cragin and Daly, 2004; Metz and Millen, 2004; O'Neill, 2005; Vittori, 2011).

I differentiate resources from declarations of sympathy. Such sympathetic expressions and transfer of actual material assets are often summarized under the term support. Expressions of sympathy are, undoubtedly, very important and may even be an indicator for the propensity to provide material support to terrorist groups. They are, however, distinct actions. Expressions of sympathy do not require any direct contact between two actors. The exchange of material resources, however, is contingent upon direct interaction. O'Neill (2005), for example, identifies different support types classifying them as moral support, political support, material support, and sanctuary. Byman (2005) analyses different forms of state support listing training, money, arms, logistical help, diplomatic backing, organizational assistance, ideological direction, and sanctuary. Byman (2008) also distinguishes between active and passive support. Active support includes tangible assistance with money or weapons. Thus, Iran is sponsoring Hezbollah with a variety of material assets (Hubbard, 2017). Passive support captures the lack of sanctions against a terrorist group. States have tolerated terrorist groups on their territory as long as they do not threaten the incumbent regime. Saudi Arabia has oftentimes been accused of harboring jihadist movements that are rooted in Wahabist ideology (Kirkpatrick, 2014). In this dissertation, I focus on what Byman calls active support.

The exchange of resources depends on the needs of the terrorist group. Various approaches exist in the relvant literature. Metz and Millen (2004) identify five categories of resource needs for insurgencies. They need 1) manpower, including people with a specific skill set, 2) financial assets, 3) material to use in their military operations, 4) sanctuary to regroup and plan activities, and 5) intelligence about their enemy. These resources focus on the operational side and are also captured by Cragin and Daly (2004). In their study about assessing the threat of terrorist groups, they name eleven tools that can

boost a groups capabilities, sorting them in four organizational and seven operational tools.[4] They define operational capabilities as the capacity of a terrorist group to carry out a series of successful attacks. Organizational capacities capture activities that sustain the groups existence and cohesiveness (Cragin and Daly, 2004, p. 25). Colin Clarke (2015) makes the same distinction between organizational and operational capabilities. His analytical framework describes the activities of terrorist groups in the realm of dark and grey economy aiming to understand how terrorists and insurgents fund their activities through illegal and semi-legal economic activities. He defines weapons, sanctuary/safe haven, intelligence, training, and financing/funding as operational capacities, and leadership, ideology, human resources, and publicity/propaganda as organizational capacities. Vittori (2011) claims that terrorist groups need a variety of tangible and intangible resources, as well as money to ensure the groups' capability to conduct violence. She expects that terrorist groups that fail to uphold a stream of resources wane and become extinct. She defines tangible resources as material assets that have a monetary value. In contrast, intangible resources are assets that a terrorist group cannot live without, but cannot easily be attached a monetary value. Tangible resources are goods that can easily be turned into money, i.e., drugs or antiquities. Intangible goods include, for example, training or intelligence. As such, money holds a particular value as it can be turned into any material resource necessary. These studies highlight that resources affect a terrorist group's performance and provide valuable classifications of resources. I build on those classifications but distinguish between resources that can be exchanged and those that are tied to the organization itself as outlined in the following section.

I first define and classify different types of resources, terrorist groups rely on. I then introduce various mechanisms of how terrorist groups can acquire resources and how variations in the access to resources translate into different behavior. I focus on the exchange of resources between the terrorist group and other actors in their environment. Finally, I explain the logic of resource allocation and how the organizational structure of a terrorist group affects its ability to manage resources.

3.2.3 The tradability of resources – an original conceptualization

Money is not the only good that can be used to purchase, exchange, or barter for another good. Any commodity that has a material value and can be transferred between two actors can be used in exchange relationships. Since the purpose of this study is to analyze the resourcing process in terms of resource acquisition and resource allocation, a conceptualization of resources needs to capture those qualities of exchangeability – both theoretically and empirically. Regardless of the resource being used in operations

[4] Organizational tools are a guiding and motivating ideology, strong leadership, an accessible recruitment pool, and publicity. Operational tools are command and control, weapons, training, operational space (i.e., time and space to plan, train, and prepare the attack), operational security, intelligence, and money (Cragin and Daly, 2004).

or to maintain the organization or the resource being tangible or not, according to the resource-based view of the terrorist group, all types of resources are determinants of a terrorist groups performance (Amit and Schoemaker, 1993).

While existing classifications of resources provide a relevant foundation for this dissertation, they are not sufficient to study the exchange of resources in particular. To that end, I develop a classification of resources that is based on their exchangeability. I adopt an original definition of resources that captures whether or not resources can be traded between organizations. Resources that have material or monetary value can be exchanged in market relationships that are structured by the principles of demand and supply. I call this property *'tradability of resources'*. Table 3.1 displays my classification of resources terrorist groups require, which is based on the criterium of tradability. Resources that have some monetary value and can be transferred across organizational boundaries are classified as tradable. Resources that cannot be moved but are fixed to a specific location or organizational idiosyncrasy are classified as non-tradable. This classification is related to the notion of immobility of resources (Barney, 1991). As I will elaborate in the next section, terrorist groups can enter exchange relations with other actors in their environment by trading resources and consequently improve their performance. The argument that actors can improve their performance by exchanging their resources, differs from arguments of the resource-based view that considers resources to be valuable to the firm if they cannot be transferred between actors. I argue that a terrorist group can perform better because it can exchange its resources and not because of some non-tradable organizational idiosyncrasies.

This classification is different to those that distinguish between tangible and intangible resources (Vittori, 2011) or operational and organizational resources (Clarke, 2015). It allows the researcher to tap into the process of resource generation. Instead of focusing on what a terrorist group can accomplish with their repertoire of resources, it is also possible to assess how terrorist groups can access specific resources. This opens up new avenues for research questions such as, for example, a) how terrorist groups exchange resources; b) how the patterns of resource exchange generate different consequences, c) if the type of resource affects the exchange mode, and d) if terrorist groups consider tradable resources differently than non-tradable ones. Assessing those questions has both academic and policy relevance.

My classification differs from Vittori's classification of tangibility in two aspects. First, it classifies training and expertise as resources with material value. Empirical evidence illustrates that human capital that is captured by training and expertise is treated as a tradable commodity. Two well-known connections illustrate the treatment of human capital as a valued commodity. PIRA sent men to Colombia to train FARC members in the techniques of urban hit-and-run tactics enabling FARC to conduct new operations in a changing environment (Ward and Hackett, 2003). Similarly, the Japanese Red Army

Table 3.1: Classification of resources

Tradable resources	**Non-tradable resources**
Money & other readily liquefiable commodities	Leadership, command & control
Weapons	Guiding ideological narrative
Training, expertise (human capital), fighters	Recruitment pool
Intelligence	
Operational space, safe haven, sanctuary	

conducted joint operations with the Popular Front for the Liberation of Palestine (PFLP) and trained with them (Zieve, 2012). In both instances one terrorist group reached their limits in what they could manage to do and sought assistance from other terrorist groups. These examples lend support to the claim that terrorist groups exchange missing resources. It also supports the argument that motivation is not sufficient to produce a credible and significant terrorism threat.

Second, money is not a separate category but another tradable resource. This is also true for other assets that are readily liquefiable. Such assets are, for example, drugs, natural resources, or antiquities. Those commodities can be sold or bartered in exchange for weapons or other resources.[5] A terrorist group that had a very diversified portfolio of such goods was PIRA which trafficked a wide variety of commodities ranging from cigarettes to drugs and weapons (Horgan and Taylor, 1999, 2003).

The attribute of tradability is not just relevant for transfers across organizational boundaries. While tradable resources can be exchange commodities in inter-organizational relations, they can also be moved within an organization. Once acquired, tradable resources can be used for exchange again, or they can be allocated within an organization. This is crucial as resources need to be moved to the cell or individual that conducts the attack or stores it for future use.[6] I provide a detailed overview of the relevant types of resources in the following sections.

Tradable resources of terrorist groups

Money and other readily liquefiable commodities

Byman and his colleagues describe money as a powerful tool as "it can be used to buy weapons, bribe local officials, pay operatives, write propaganda, provide a social network that builds a popular base,

[5] Terrorist groups also engage in human or arms trafficking. This can have a dual purpose. Arms and people can be trafficked merely for economic benefits. Terrorists can use human trafficking also to access human capital or arms trafficking to use the arms themselves.

[6] Specifically in Western countries, more and more terrorist attacks are conducted by lone actors that use everyday items that can be acquired by those individual who also carries out the attack. However, my analysis focuses on attacks that are conducted by an organization in the background excluding lone-wolfe terrorism. Thus, organizational logic applies.

and otherwise fill a myriad of purposes" (Byman et al., 2001, p. 87). Money is the ultimate tradable resource, for it can be exchanged for any other resource that is missing but required to conduct an attack. Money is not just used as a medium of exchange. As a commodity of exchange, money also indicates the price and value of other goods. Further, it has value in itself and thus can be used to store wealth (Cohen, 1998, p. 11).

Money is oftentimes generated through trafficking other illicit and readily liquefiable goods. Terrorist groups engage in various forms of illicit trafficking. While the trafficking of arms and people might have immediate operational purpose, the trafficking of drugs, antiquities, or natural resources mostly serves the purpose of being turned into operational resources. Of course, arms and humans can and might also be trafficked for financial reasons, thus having a dual purpose. Terrorist groups use the globalized economic system not only to traffic their goods, but also to launder their financial returns. Many terrorist groups hold legal businesses and bank accounts, some of them on a global scheme. PIRA, for example, used a variety of legal businesses to launder money and to fund their organization (Clarke, 2015, p. 31).

Weapons

Terrorist groups need weapons to conduct an attack. These weapons range from simple box cutters or matchsticks to sophisticated weaponry, including small arms and weapons of mass destruction. Considering that terrorism is a tactic chosen by the militarily weaker actor against a stronger opponent, the common choice of weaponry often are small arms and light weapons (SALW). They are easy to use, carry, and conceal (UNODA, 2017).[7] The literature identifies the threat that emerges from terrorist groups acquiring these kinds of weapons (Hartung and Berrigan, 2007). The majority of terrorist attacks over the last decades have been committed using small arms and light weapons (Clarke, 2015; Hartung and Berrigan, 2007; LaFree, Dugan and Miller, 2015). Those arms are used in various types of attacks ranging from targeted assassination to indiscriminate shootings in public places.

The definition of SALW does not include explosives. However, terrorist groups often use them in various forms. Using data from the Global Terrorism Database (GTD), LaFree and his colleagues find that between 1970 and 2012 terrorists use explosives in 50.73% of all attacks (LaFree, Dugan and Miller, 2015, p. 100). Explosives can be used in various types of attacks. They are used by suicide bombers, as car bombs, or improvised explosive devices (IEDs).

[7] Small arms include revolvers and self-loading pistols, rifles and carbines, assault rifles, sub-machine guns, and light machine guns. Light weapons include heavy machine guns; hand-held, under-barrel, and mounted grenade launchers; portable anti-tank and anti-aircraft guns; recoilless rifles; portable launchers of anti-tank and anti-aircraft missile systems; and mortars of less than 100mm caliber (Small Arms Survey, 2015, p. 3). The terms SALW includes both the weapon systems and the ammunition.

Terrorist groups can access weapons from states that are supportive of their cause, purchase them on the black market, or steal them from weapon repositories. Terrorist groups also turn regular items into weapons. In the recent years more and more attacks are committed using automobiles or planes. Examples include the attacks in Nice (July 2016), Berlin (December 2016), or the attacks on the World Trade Center and the Pentagon (September 2001). Those attack types are more common in Western countries, where other weapons are restricted items, while cars and other regular items are readily available. However, those regular items are just another form of weaponry, which can be traded between actors. For example, one group might possess the skills to steal cars and can offer that car to another group.

Training and expertise

Training is a crucial component of a terrorist group's capabilities. As Horowitz claims, "Sometimes technical expertise is not enough (...). Even though al-Qaeda had money, committed members and weapons, it needed to send its members to Hezbollah (...) to pick up the tacit knowledge necessary to conduct its own suicide operations" (Horowitz, 2010, p. 165). It is necessary that the individual fighters of a terrorist group get educated in various tactics and technical requirements needed to carry out attacks at varying levels of sophistication. Training has a dual purpose: first, members of the group are taught the tactical requirements, and second, the group exposes itself to innovation by seeking external or distributing internal expertise.

Training requires people who are skilled with practical and technical knowledge to teach others and a space to train secure from detection. Physical space is important, since terrorists not only have to learn the technical aspects, but also need to train how to handle their weapons, make bombs, or how to conduct surveillance and reconnaissance. While explicit knowledge can be learned from books and is accessible via the Internet or other forms of remote learning, tacit knowledge requires personal experience (Kenney, 2007). AQ's refuge in Sudan and Afghanistan provided the organization with the geographical space to undertake extensive training sessions without the need to remain covert. When NATO forces moved into Afghanistan in the aftermath of 9/11, AQ lost their training ground and had to extend their training from the physical space into the virtual space of the Internet publishing manuals on bomb making or the ideological reasoning (Cruickshank and Ali, 2007). The distribution of educational material has been a common feature since the beginning of modern terrorism and the invention of the printing press.

Terrorist groups have repeatedly collaborated with other actors such as other terrorist groups, insurgents, or states. Madhok states, "Collaboration is a useful vehicle for enhancing knowledge in critical areas of functioning where the requisite level of knowledge is lacking and cannot be developed within

an acceptable timeframe or cost" (Madhok, 1997, p. 43). Terrorists train with other actors in order to learn tactical or technical knowledge, which strengthens their capabilities and advances their strategic agenda to increase their chances of success. It may also allow them to adapt to new developments in their environment, thus increasing their longevity. The ability to learn is, therefore, a predictor of the potential threat a terrorist group poses. "Since learning is the route through which organizations can seek solutions to the problems that bound their freedom of action and limit their ability to pursue their goals in changing operational and security circumstances" (Jackson et al., 2005, p. x).

Operational space, safe haven, sanctuary

Terrorist groups need a sanctuary where they can regroup, train, and plan an attack. This space can be in a group's home base in an area outside of government control or in another country that is willing to provide shelter to the terrorists or unable to prevent them from doing so. Sanctuary is one of the most vital resources of a terrorist group. A safe haven is an area over which the government has no control or no knowledge of its existence. That means that state institutions do not reach every part of the country. It can be as large as an entire country or as small as a neighborhood or someone's living room. Critical factors for a safe haven are geographical inaccessibility and remoteness such as jungle territory or vast hinterlands without functioning infrastructure. Demographic and socioeconomic factors can produce a space that is outside the authorities attention and allows terrorists to blend in with the local population. In 2016 Belgian authorities realized that terrorists could hide in sympathetic neighborhoods in Brussels. After the attack on Brussels airport in March 2016, one of the attackers, Salah Abdeslam was hiding in the neighborhood Molenbeek, where he had connections to the criminal milieu and was able to hide among the population. He was arrested only after several raids (Graham-Harrison and Rankin, 2016).

Intelligence

To adequately plan an attack, terrorist groups need to identify a potential target and assess the intricacies that come with a specific type of attack and target. They need to gather information and understand potential responses that their attack is likely to trigger (Cragin and Daly, 2004, p. 50). Incorrect or incomplete intelligence can lead to unsuccessful attacks, unintended responses, and can be counterproductive to their cause or to the integrity of the group. For example, if a terrorist group wants to hit a specific person, it needs to identify the schedule of this person and the likely routes taken. It also needs to assess the best spot to attack depending on what type of weaponry it is using. Terrorist groups, much like their governmental counterparts, use various types of intelligence gathering. They use human sources gathering information about potential targets through surveillance and reconnaissance, openly

published material or Google Earth to assess the vulnerabilities of their enemy and target their attack (Clarke, 2015, p. 17). Reliable intelligence is not only operationally important but also relevant for the overall strategic calculation of the terrorist group.

Non-tradable resources of terrorist groups

Leadership, command and control

The leadership of a terrorist organization sets the general strategic direction of the group. It provides an ideological vision, coordinates the actions and needs to ensure the cohesion of the group, potentially uniting various factions within the organization. Leadership is connected with all other resources of the group. Without good leadership the resources might be misdirected or opportunities lost. Decapitation is always discussed as an effective counterterrorism strategy as it has the potential to target successful leaders (Cronin, 2009). However, theoretical and empirical assessments of decapitation strategies come to ambiguous findings (English, 2009). Depending on the structure of the organization, built-in redundancies might render the removal of a leader useless as some other person might step into place. Also, in case of a charismatic leader the cult that surrounds a personality may create a backlash effect in case of decapitation. Some leaders may not lose their attraction and power over the people even if they are dead. Osama bin Laden has not only been the strategic and ideological leader of AQ but also an inspirational figurehead of violent Jihad. His death has done little to decrease the motivational and military power of AQ. Decapitation works in the absence of a viable successor to take over the operations. In the case of AQ the killing of Osama bin Laden lead first to Ayman al-Zawahiri taking over, and ultimately, to the decentralization of the organization (Jenkins, 2011). With no leadership to provide a united vision under constant counterterrorism pressure, the organization factionalized and diversified. This can lead them to deviate from their original strategic mission but does little to decrease the threat.

Guiding ideological narrative

An ideology is a set of beliefs about the state of the world held by an individual or a group (Zald, 1996). It addresses specific social, political, or economic grievances - whether real or perceived. It provides a vision about how to meet those grievances, providing people a platform to voice their perceptions of inequality and injustice. Having a clear ideological narrative is important for terrorist groups as it maintains its purpose, motivates people to devote their work and potentially their life to the cause, and to recruit new members. It provides a lens through which to assess reality, lending legitimacy to the terrorist group in the eyes of their supporters. Empirical evidence suggests that terrorist organizations are very cognizant of the importance of ideology. Violent jihadists, for example, cite the Quran to

legitimize their actions or reject Western imperialism and consumerism (Holbrook, 2010).

A resonating ideological narrative can arouse transnational enthusiasm. This can increase a terrorist group's resilience especially when facing counterterrorism pressure in a certain geographical region. Even if its capabilities are severely hampered in one place, they can regroup and continue in other regions. With the downfall of core IS that is forced to relinquish its territories in Syria and Iraq, it moves to other operational arenas. IS affiliated groups evolved in Libya and Egypt where they find support by the local population (Awad, N.d.). As long as the ideology resonates with sympathizers a terrorist group is almost impervious to interdiction. Even more so, combating an ideological movement through military force only strengthens the terrorist group's resolve and the resolve of its supporters. Forceful military repression often results in discrimination and alienation, humiliation, frustration and, oftentimes, collateral damage (Paul, 2009). Over time this harms a moderate civil society through radicalization, providing a fertile mobilizing ground for terrorists. Terrorist groups are aware of the need to communicate a clear ideological narrative. As such, they remain cautious when engaging in drug trafficking or other types of criminal activity as well as changing the face of the organizations for fear of losing the support from strict believers of the ideological narrative or even of. Terrorist groups need to find the balance between a rigid guiding ideology and enough flexibility to utilize as many opportunities as possible.

Publicity and propaganda

Publicity is important to advertise the ideology and cause of the terrorist group. Terrorist groups use coercion to achieve their goals. With attacks against random civilians they aim to pressure the government into political decisions that promote the terrorist groups goal. This strategy depends on the terrorist group's ability to spread fear. To that end, they need to publicize their attacks. If only a limited audience learns of an attack, fear does not spread to the rest of society. Terrorist groups usually claim responsibility for attacks to propagate their cause, to spread fear among the enemy population and to mobilize supporters. It directly impacts the access to other types of resources. In the 'battle for hearts and minds' terrorist groups invest a lot of effort in communicating with their audiences. IS has an entire department dedicated to marketing and communication showing a great deal of professionalism (Sanzgiri, 2015). The group produces videos that are streamed worldwide and print periodic journals to address their constituencies directly and with a geographical scope that goes far beyond their core territory. While the reach of IS propaganda is astonishing, it is nothing new. Since the beginning of modern terrorism, organizations printed leaflets to advertise their message, to generate sympathy for their cause, and to mobilize support (Offard, 1986, p. 28). Consequently, propaganda is an important weapon in the operational repertoire of terrorists.

Recruitment pool

In order to prevail or grow over time, a terrorist group needs a constant supply of new members. A terrorist group needs to recruit faster than they lose personnel. By recruiting new members, the group imports skills and human capital. As mentioned above, terrorist groups strategically claim responsibility and publicize their goals and activities to increase their resonance among supporting populations. An ideology that is inclusive enough to speak to a wide audience combined with credible activities make the membership in a terrorist organization an attractive alternative to people with often rather bleak prospects in life.[8]

The process of radicalization and recruitment is not a linear one. People can be recruited in personal meetings or via the Internet. While the process of radicalization is different for every individual, some general patterns are observable across cases. People have to have a cognitive opening for the ideology to resonate. They feel wronged by society in some aspects that the membership in the terrorist group promises to alleviate. Radicalization and consequent recruitment into the organization is a social process. In many cases, terrorist groups are attractive since they provide a sense of belonging and group identity to people who are struggling to find their way in life. Through this social process of radicalization people ultimately accept violence as a viable response to their grievances, turning sympathizers into active participants in terrorist groups (Helfstein, 2012; McCauley and Moskalenko, 2008).

3.3 The acquisition of resources

3.3.1 Terrorist groups in their resource environment

I link the resourcing opportunities to the environment of terrorist groups as it provides them with a 'menu' that is specific to the respective environment. Similar to legal business firms, terrorist groups are located within a specific environment that determines which resources are available and accessible. Each group needs to work with the resources it can access. The variation in a terrorist group's behavior is a function of the environment that introduces a variation in the repertoire of resources.

Previous research acknowledges the environment to have an effect on the resourcing strategies of organizations in general (Child, 1972; Glazer and Weiss, 1993). The findings can be applied to terrorist groups in particular as the acquisition of resources provides the terrorist group with opportunities but also with challenges.[9] In order to better understand the performance of terrorist groups I consider the possibilities of terrorist groups that vary across terrorist groups' environments. The environment encom-

[8] There are many reasons why an individual may join a terrorist group. For a review of the literature see, for example, LaFree, Yang and Crenshaw (2009), English (2009), or Lia and Skjølberg (2004).

[9] This literature is discussed more detailed in chapter 4.

passes those elements outside an organization's boundaries that affect its ability to survive and achieve its ends. Based on this conception the environment can be perceived "as a store of resources as well as a source of opportunities and constraints, demands and threats" (Scott and Davis, 2014, p. 14).

Previous research classifies this resource environment in a way that highlights the factors relevant to the organization. Evan (1967) defines the 'organization set' as all organizations that one focal organization interacts with, in order to access resources that can then be translated into market output. Dill (1958) coins the term 'task environment' to highlight the key elements outside organizational boundaries. James Thompson (1967*a*, p. 27-28) argues that an organization's task environment is composed of 1) customers and clients; 2) suppliers of materials, labor, capital, equipment, and workspace; 3) competitors for markets and resources; and 4) regulatory groups, such as government institutions, unions, or inter-firm associations. The task environment conceptualizes the actors as organizations that can interact with each other. This highlights the importance of focusing on the organization as the level of analysis. Many studies of terrorism are implicitly located within this categorization without acknowledging it explicitly. Terrorism research deals with 1) terrorist groups generating support from their client base (Vittori, 2011); 2) the exchange of material resources (Horowitz and Potter, 2014; Phillips, 2013) and the importance of operational space or sanctuary (Sinno, 2008); 3) competition between terrorist groups either for resources or constituency support (Conrad and Greene, 2015; Nemeth, 2014); and 4) the impact of both the anarchic task environment of terrorist groups (Piazza, 2008) and counter-terrorism pressure (Cronin, 2015).

Thompson's ((1967*b*)) theory on 'Organizations in Action' provides a valuable foundation for exploring a terrorist group's exchange relationships with other actors. It highlights the importance of focusing on external relations of organizations instead of placing them within a vacuum. Organizations – and hence terrorist groups – are constrained by the constellation of actors that are present in their environment. Investigating those constraints helps explaining part of the variation in a terrorist group's performance. Conceptualizing terrorist groups as organizations embedded in their respective task environment allows me to explain organizational behavior as a function of external factors. I attribute a terrorist group's behavior to elements in its task environment that it interacts with. Given that the information available on the internal dynamics of terrorist groups is limited to the outside observer, focusing on environmental factors influencing terrorist groups' behavior offers a theoretical framework that can be empirically evaluated. However, it discounts relevant internal dynamics. Knowing and incorporating those internal elements would increase the empirical precision of the theory and enhance our understanding of terrorist groups' behavior.

Resource dependence theory (RDT) studies how external resources affect the behavior of the organ-

ization. Procuring external resources is seen as a crucial guideline of strategic and tactical decisions by the management of firms. Pfeffer and Salancik (1978) build on Thompson (1967*a*) formulizing the argument that firms – or rather organizations in general – depend on resources, which originate within an organization's environment. Resources can be owned by other organizations in the same operative environment creating interdependences between organizations. RDT defines critical and scarce resources. Critical resources are those without which the organization could not function. Resources that are scarce increase their value of possession (Pfeffer and Salancik, 1978, p. 68). This leads to the attachment of power to an organization's resources vis-à-vis other organizations in the environment that have fewer resources (Emerson, 1962). Thus, terrorist groups that manage to increase their resources – either critical or scarce – can increase their operational and organizational capabilities. According to Emerson (1962, p. 32) an organization's dependence on another actor increases (1) in proportion to the organization's need for resources, and (2) in inverse proportion to the ability of others to provide the same resource or performance. Pfeffer and Salancik (1978) suggest that organizations alleviate dependence by diversifying their exchange partners, reducing their reliability on a single partner. Jodi Vittori (2011) develops this argument with respect to terrorist groups, arguing that terrorist groups that can choose from a larger pool of resource strategies are more capable and enjoy greater autonomy from their respective suppliers. By maintaining alternative suppliers, a terrorist group can reduce its dependence and uncertainty in its task environment. Considering that terrorist groups face constant pressure on their organization and operations, they need to exploit as many resource possibilities as possible. That way they ensure autonomy from a single supplier and resource, securing their survival in case this resource is cut (Vittori, 2011).

3.3.2 Relational rents

Relational rents include all benefits that arise through the exchange between a terrorist group and other actors in its resource environment. Those rents depend on the resources that a terrorist group gains access to through cooperative interactions. Through relational rents a terrorist group can increase its performance through the interaction and exchange with other actors. The underlying premise of cooperation between terrorist groups and other actors is their mutual benefit from such a relationship (Williams, 2002). For establishing those kinds of cooperation, ideological affinity is secondary to matters of pragmatic expediency. Since short-term engagement does not reveal too much secret information about the organization or future operations, trust is not as important. The benefits in terms of operational and logistical assistance may not endanger the organization too much. Those alliances are purely tactical. They are founded on shared interests alone and not on a combination of interests and ideology. Tactical alliances can shift alongside interests and are not expected to last indefinitely (Moghadam, 2015, p. 24).

Those alliances can be labeled as 'marriage of convenience.' Terrorist groups may establish tactical alliances when facing a common opponent. Multiple terrorist groups aligned with each other in Iraq after the U.S. led invasion in 2003. Irrespective of their ideology or ultimate goal, religious and nationalist groups forged tactical alliances to oppose the U.S. and their allied forces (Moghadam, 2015, p. 24).

Dyer and Singh (1998) develop the concept of relational rents. They provide a comprehensive theory relating dyadic and network connections of firms to their level of performance. Their contribution helps to bridge the gap between the organizational perspectives on firm behavior and network theory, which identifies inter-organizational relationships as critical when analyzing a firm's environment (DiMaggio and Powell, 1983; Grandori and Soda, 1995; Nohria, 1992). The unit of analysis is no longer the independent organization but the organization with its dyadic relations to other organizations. The focus is on the interactions between organizations and their position within an inter-organizational network. Gulati (1998) argues that firms enter voluntary relationships to exchange and share resources, and collaborate to jointly develop or produce products. These connections allow them to benefit from network resources (Gulati, 1998). Network resources are "external resources embedded in the firm's alliance network that provide strategic opportunities and affect firm behavior and value" (Lavie, 2006, p. 638). This relationship between network resources and performance is the core of social capital theory (Bourdieu, 1986; Burt, 2007; Coleman, 1988; Putnam, 2000).[10]

These exchange relations between terrorist groups can be classified as logistical and operational cooperation (Karmon, 2005). Logistical cooperation can boost the operational capabilities of terrorist groups. It includes a variety of activities necessary in preparation of an attack. Logistical cooperation can significantly affect a terrorist group's operational success. It entails the exchange of knowledge and intelligence, financial or material support, or the provision of a safe haven (Moghadam, 2017, p. 34). This kind of cooperation requires more coordination and is more risky, but also includes more benefits. The exchange between LTTE with Palestinian groups illustrates this logistical cooperation. The LTTE provided logistical support for Harakat al-Mujahideen transporting weapons to Abu Sayyaf on its behalf (Jayasekara, 2010; Moghadam, 2017). Moving weapons or money requires skills and a network of willing participants. Being able to work together with a terrorist group that possesses those skills increases a terrorist group's operational and tactical range.

Operational cooperation entails the joint planning and execution of an attack (Moghadam, 2017, p. 36). Terrorist groups can pool their material resources, their knowledge and intelligence required for carrying out the attack, thereby increasing their chances of success and higher impact. Sometimes cooperation is necessary since another group can provide access to an area that is not easily penetrable

[10] Social capital theory is discussed more detailed in chapter 6.

by some group. German militants, for example, provided support to the Palestinian Black September group that carried out the attack on the Munich Olympics 1972 (Alexander, 1989). In this dissertation I focus on these kinds of short-term transactional types of cooperation.[11]

Terrorist groups choose to cooperate with other terrorist groups either because they feel a threat to their survival, or because they can boost their overall capabilities (Crenshaw, 1985; McCormick, 2003). Cragin et al. (2007, p. 6) suggest that the exchange of resources can have a threefold effect, increasing 1) the operational range of terrorist groups, i.e., allowing it to do new things that it could not do before, 2) the operational effectiveness, i.e., allowing the terrorist group to do things that it could already do, but better than before, and 3) the operational efficiency, i.e., allowing the terrorist groups to carry out operations that it could already carry out, but do so at a lower cost and with fewer resources. Such a terrorist group can potentially boost its operational range by adopting new tactic. To do so, it might need new weapons or training that allow the terrorist group to rely on a larger tactical repertoire (Cragin et al., 2007, p. 6). A terrorist group that manages to enhance its operational effectiveness can, for example, increase the number of casualties, reduce the risk for its operatives, or increase the likelihood of hitting the intended target.

In these alliances, terrorist groups maintain their organizational independence. Instead of integrating (parts of) the organizations, their cooperation is restricted to one activity at a time. Those interactions can be formal or informal. Often they rely on some kind of barter agreements, where one actor provides a specific good in exchange for another. While the rational framework requires both sides of a co-operative relationship to have more net benefits, the objectives do not need to be identical. Ideological perspectives or goals can be different as long as a terrorist group can further their intermediate goals through cooperative agreements. The management literature shows that the distribution of benefits and resources might be asymmetrical to the disadvantage to the supplier (Lavie, 2006, p. 645). This can be the case in asset-specific relationships, where the supplier and buyer may value a specific asset differently (Dyer and Singh, 1998). A terrorist group may require specific knowledge and training that another terrorist group might be able to supply. While the first groups survival might depend on the development of new tactics, the second group may supply the training for financial benefits instead of existential need.[12]

The number of performances that depend on a specific type of resource, such as specific technolo-

[11] Logistical cooperation may offer valuable insight into a terrorist group's activities outside of attacks. Data restrictions make it nearly impossible to study. Analyzing operational cooperation is a valuable and important first step to explaining terrorist groups' behavior.

[12] PIRA is known to have closed such deals. In the early 2000s PIRA sent experts on urban guerilla tactics and explosives to FARC, in order to train them in tactics and attack types previously unknown to FARC. In exchange they received financial compensation (Ward and Hackett, 2003).

gical assets, increase when firms form links to other asset-specific firms (Ahuja, 2000; Lee, Lee and Pennings, 2001; Rothaermel, 2001). This hints towards resource exchange in relationships akin to supplier-customer relationships. The innovative capacity of a firm is correlated with these inter-firm linkages (Stuart, 2000). Lavie (2006) argues for a twofold effect. The effect of the directly shared resources intended to complement or pool with existing resources along with the indirect protracted effect of shared resources interacting with existing resources. A terrorist group, for example, can have a sufficient supply of recruits. However, those members can lack the specific training to produce a specific type of violence. In addition to the effects of training (direct effect), having the ability to work together with well-trained members of another terrorist group can amplify the performance of those recruits (indirect effect).[13]

3.4 The allocation of resources

3.4.1 Previous conceptualizations of organizational structure

In his analysis of insurgency groups Johnston (2008) recognizes the problems stemming from vaguely specified concepts of organizational structure. In this section I provide an overview over prior conceptualizations of organizational structure. This is the foundation for the conceptualization of organizational structure used in this dissertation. The organizational structure determines how the work efforts of individuals and teams are orchestrated and how resources are distributed. It shapes how jobs and tasks are divided and integrated and how the hierarchy within the organization is established.

Child (1972, p. 2) defines organizational structure as the "formal allocation of work roles and the administrative mechanisms to control and integrate work activities including those which cross formal organizational control." In his influential article 'The Nature of the Firm' Ronald Coase (1937) asks whether the firm's organization affects its allocation of resources. This spawned a large body of research (e.g., Aghion and Tirole, 1997; Williamson, 1975). In firms formal and informal processes and relationships affect the working dynamics of the firm. It is difficult to capture an entire picture of what is going on inside a firm, since informal relationships are hard or impossible to view from the outside. These challenges are even more pronounced for clandestine actors, as even formal processes are not easily detectable from the outside.

While data constraints challenge the researcher analyzing the organizational structure of clandestine actors, tackling these challenges is both interesting and important. We can gain a more fine-grained

[13] Horowitz and Potter (2014, p. 2) illustrate this mechanism with the example of Jemaah Islamiyah (JI) continously receiving training from AQ members allowing JI to increase their sophistication and deadliness of attacks.

understanding of terrorist groups when we are able to draw conclusions from their organizational dynamics. Morselli, Giguere and Petit (2007) analyze clandestine organizations and find that they have different structural properties depending on the stage of preparing an attack they are in. The structure of the cell that carries out the attack might look substantially different than the cell in the planning and resourcing stage. Whereas it is nearly impossible to track the structural make-up of terrorist cells over time in a large-n research design, this finding highlights the significance of organizational dynamics for the specific activities of terrorist groups. Thus, only focusing on the attack cell might 1) lead to biased insights into the structure of terrorist organizations as a whole, and 2) leave possibilities to disrupt the organization prior to the attack unused. I focus on the structure of terrorist groups in relation to its resource acquisition and allocation activities. Understanding how the resourcing process and organizational structure of terrorist groups interact can be helpful in devising effective counter-terrorism strategies.

Theories of strategic management suggest that organizations need to establish a structure that minimizes transaction costs (Williamson, 1975). Transaction costs are those costs that derive from inefficiencies associated with incomplete information that creates uncertainty (Williamson, 1981). They also suggest viewing hierarchy not simply in terms of power and status, but also in terms of a decision on how to cluster tasks and establish coordination mechanisms within an organization (Scott and Davis, 2014, p. 163). Thompson (1967*b*, p. 59) writes that, "It is unfortunate that [hierarchy] has come to stand almost exclusively for degrees of highness or lowness, for this tends to hide the basic significance of hierarchy for complex organizations. Each level is not simply higher than the one below, but is a more inclusive clustering, or combination of interdependent groups, to handle those aspects of coordination which are beyond the scope of any of its components." Grouping together specific activities can reduce transaction costs. Integrating members and tasks of an organization allows for them to share resources and skill-sets.

Dugan and Gibbs (2009) classify the organizational structure of terrorist groups similarly to the management literature using three criteria. First, a terrorist group can be vertically differentiated, capturing the number of layers of hierarchy and supervision within the group. This describes hierarchical groups such as the RAF, which had a clearly defined set of leaders and subordinates (Crenshaw, 1985). Second, terrorist groups can also be horizontally differentiated. This captures the number of independent subunits working on pieces of a larger, more complex task (Dugan and Gibbs, 2009, p. 113). Hamas has such a set-up, where it is organized in functional cells, some working on fundraising or social services, while others carry out military operations (Hill and Ward, 2002). Third, terrorist groups can be spatially dispersed over several geographical locations. This is the case for AQ, where individual cells work glob-

ally and independently from each other, both in gathering resources and in carrying out attacks (Cronin, 2006).

Jordan and Horsburgh (2005) provide evidence from the Madrid attacks in 2004 that locals unaffiliated with a centralized organization can carry out effective attacks. In light of such events it is crucial to understand how terrorist groups resource their operations, and what effect the organizational structure carries. This is even more crucial as trends show a shift in organizational designs towards more decentralized organizational structures. Parallel to the decentralization of terrorist groups, resources also become more decentralized, thus decreasing the operational inefficiencies of such organizations (Laitin and Shapiro, 2008). As the market in weapons and information about the production of weapons has globalized, local networks without central directives are given the opportunity to take autonomous action in the name of the broader organization (Laitin and Shapiro, 2008, p. 224). This can be seen by the recent attacks in Europe carried out by supporters of IS. Adapting to local opportunities and constraints, individual attackers choose their own target and tactic. They coordinate the logistical intricacies of the attack themselves including only a few other people that may or may not be affiliated with IS themselves.

Recent approaches adopt a network perspective (Arquilla and Ronfeldt, 2001). The network approach focuses on the relations of a set of actors, while recognizing the implications of these interactions on the behavior of these actors (Knoke, 1990; Latour, 1993). Following this view, actors are interdependent, which affects how they can reach their goals. Arquilla and Ronfeldt (2001, p. 7) apply this view to terrorist groups, claiming that these networks have very little or no hierarchy or official authority. Decision-making and tactical operations can be initiated and carried out locally without clear central leadership. New information technologies benefit such organization (Knoke, 1990, p. 93). In the next section I conceptualize the organizational structure of a terrorist group by the degree of centralization.

3.4.2 Conceptualizing the organizational structure by the degree of centralization

The degree of centralization is determined by the degree to which the power over decision-making is distributed within the group. I define the organizational structure to be either centralized or decentralized. While in reality the organizational structure cannot be characterized as a clear dichotomy, I make this binary distinction in favor of analytical clarity of the conceptualization. Centralization captures the degree to which activities of a terrorist group, i.e., planning and decision-making, are concentrated within a particular part of the group. In centralized terrorist groups all important decision-making powers are with the leadership of the group, i.e., the center of the group. Centralization is a measure for 1) concentration of power, 2) the differentiation between core and peripheral actors, and 3) the location of

decision-making in the chain of command. It captures the extent to which power over decision-making in the organization is dispersed among its members (Mintzberg, 1980, p. 326).

In centralized terrorist groups the authority to make decisions is concentrated at the strategic leadership of the group. It is responsible for coordinating strategic actions and making operational and logistical decisions. In decentralized terrorist groups, the authority to make decisions is delegated to lower levels. The conceptualization of terrorist groups based on centralization is closely related to the concept of hierarchies. In a hierarchical organization the leadership delegates tasks to lower levels. The lower levels are bound by the decisions made by the upper levels. In some instances there may be coordination among people on the same level, but most commonly the integration and coordination of tasks in a hierarchy is vertical instead of horizontal. Each sub-ordinate reports back to the upper level and receives new orders. Centralized terrorist groups have communication channels that integrate the divisions of the organization. Management literature finds these to be important for completing tasks (Arrow, 1974; Galbraith, 1973; Henderson and Clark, 1990; Mintzberg, 1979). Early communication research states that networks with shorter distances between each node to a central node perform better concerning the completion of complex tasks (Bavelas, 1950). The central node acts as an "information integrator", collecting, filtering, and distributing the relevant information (Borgatti and Lopez-Kidwell, 2011, p. 48). In centralized terrorist groups, the leadership can decide what resources are needed for which task, coordinate their exchange, and keep track of the resources for future development. This decision-making power of a centralized authority is attributed to their advantage in accessing to relevant information. Since the different sections of the group communicate with the central authority, the leadership knows which resources are present in which part of the organization. It can plan and coordinate the separate sections in a way that supports the overall goal of the organization.

Decentralized terrorist groups have a flat hierarchy. In decentralized terrorist groups, the individual cells are not highly specialized. Since the individual cells are not integrated in a central coordination process, they do not receive tactical directions, material contributions, or cognitive resources by other parts of the terrorist group. Instead, they need to capitalize on the knowledge and resourcing opportunities that are present in their cells. Therefore, each cell needs to either include people that complement each other by contributing their own specialist knowledge, or they need to be generalists capable of providing what is necessary to complete a mission successfully. Mostly, those cells are responsible for their own actions and very rarely communicate with each other. Within the individual cells there might by some central authority and hierarchy installed, but not between the cells that constitute the organization. Those organizations are often labeled with the term 'leaderless resistance' as they are connected by the same

broad goals and ideology but not controlled by a common authority (Kaplan, 1997).[14] Sageman (2004, 2008) defines the Jihad movement as such a decentralized organization and attributes AQ with features of leaderless Jihad. Eilstrup-Sangiovanni and Jones (2008) similarly characterize AQ as less dangerous than people might commonly think, because its decentralized organization amplifies problems of coordination and communication.

A common point that fosters the prevalence of networks in practice and in research is that they have many advantages that are rooted in their fluid structure (Eilstrup-Sangiovanni and Jones, 2008, p. 8). Eilstrup-Sangiovanni and Jones (2008) combine theoretical and empirical evidence to contrast the advantages and disadvantages of decentralized organizations. I focus on how the organizational structure is influenced by a terrorist group's environment and on how it determines the resource allocation of a terrorist group. In other words: I focus on the determinants and consequences of a terrorist group's organizational structure. To develop those specific arguments in the following chapters, I discuss the advantages and disadvantages of the specific structural set-up of decentralized organization in the following two sections as it is important to understand the interconnectedness of each of these characteristics.

Advantages of decentralization

Decentralized organizations are found to be more resilient, that is, they are better at withstanding disruption efforts. This is due to the lack of one central member, whose capturing cripples the entire organization. Decentralized organizations also recover fast because they can replace captured members. This capacity is promoted by two structural criteria that Eilstrup-Sangiovanni and Jones (2008, p. 15) call 'loose coupling' and 'redundant design', which reduce the vulnerability of the entire organization. Loose coupling refers to members of a decentralized organization being connected as little as possible and as much as necessary. Organizations decrease the amount of people who are privy to information about other members of the group or details of a specific operation. In case of one person being captured and interrogated, this person does not know enough to jeopardize the entire organization. Helfstein and Wright (2011) find that since law enforcement agencies have only limited knowledge about the organization, the probability that they capture a central member is smaller in decentralized organizations than in centralized ones. Their finding is supported by empirical evidence from studying criminal networks that supposedly rely on built-in redundancy to avoid the disruption of the group (Bruinsma and Bernasco, 2004; Kenney, 2007).

'Redundant design' means that members can replace another member if necessary, allowing the

[14] Terrorist groups can include all specialized divisions in one cell. However, this is only feasible if the terrorist group is very small, leading to other problems, such as, the lack of certain specialties.

operation to continue without disruption (Burt, 1992). There are two types of redundancy. Structural redundancy refers to a structural design in which any member has a structural equivalent. For example, where one member connects two otherwise disconnected parts of the organization the capture of this member may potentially severely disrupt the organization. By having another member in the same bridging position the organization ensures its resilience. If two members fulfill the same functional role in the organization they are functionally equivalent.[15] A terrorist organization that has two members with, for example, the skills to assemble a bomb can still carry on if one of them gets captured. Terrorist organizations build redundancy into their organization even though they increase their visibility and offer more points for security breaches. For clandestine organizations, every additional person who knows other members or details of an ongoing operation may become a liability.

Previous research argues that decentralized organizations are better at adapting to changes in the environment (Eilstrup-Sangiovanni and Jones, 2008, p. 8). Based on the loose coupling criterion explained above, boundaries and internal connections of the organization are more flexible than in a centralized organization. Whereas in a centralized organization change requires fundamental restructuring and the central leadership gives the direction of change, a decentralized organization can react to external stimuli where necessary while leaving the rest of the organization unconcerned. Decentralized organizations can disconnect from abundant contacts and form new connections where necessary (Thompson, 2003, p. 144). For example, if a terrorist organization no longer requires the skill-set of a specific member, but requires members with different know-how, it is relatively easy to sever connections to the old member and get into contact with new ones. Eilstrup-Sangiovanni and Jones (2008, p. 15) content that decentralized organizations are able to relocate geographically. Considering the relative lack of a physical infrastructure allows them to move operations quickly from one geographic area to the next, thus increasing their adaptive ability.

Closely related to adaptability is the scalability of organizations. Scalability is the ability to easily add new members (Eilstrup-Sangiovanni and Jones, 2008, p. 14). If new challenges require new skill-sets or geographic expansion, decentralized organizations can adapt by adding new members (Mayntz, 2004; Podolny and Page, 1998; Powell and Smith-Doerr, 1994). Decentralized networks that are distributed over large geographical areas and divers parts of the population can also benefit in terms of recruitment. Their membership pool connects to different parts of the society, whose human capital might be beneficial to the organization (Klandermans, Kriese and Tarrow, 1988). Those recruitment networks can span large geographic areas. As such, IS is able to recruit people in Europe based on their

[15] In reality no two members are exactly the same. If their skillset is suffiently interchangeable, those two members are functionally redundant.

members that are already located in Europe. Research identifies the wider recruitment scale as a primary advantage of decentralized organizations. Scalability is also promoted by the advances in communication and information technologies enabling organizations to coordinate activities over long distances (Eilstrup-Sangiovanni and Jones, 2008, p. 14). Ample evidence reports how clandestine organizations benefit from using the internet to coordinate and plan their activities, to move funds, and to mobilize supporters (Zanini and Edwards, 2001).

Decentralized organizations have advantageous information processing capacities. In a centralized organization, the decision-making authority receives a lot of information that it needs to process simultaneously, increasing the risk of congestion and delay (Eilstrup-Sangiovanni and Jones, 2008, p. 13). Given that every person has limited cognitive capacities, some information may be overlooked or decisions might take longer to be made. In addition, members of the terrorist group may feel more valued and motivated to fight for the collective goal if they are included in the decision-making process. Individual members have more discretion over their actions as they match the information they receive to the local requirements (Baker and Faulkner, 1993; Powell, 1990; Scharpf, 1994). Decentralization capitalizes on the specific knowledge and skill-set of other members, potentially resulting in better decisions. Horizontal communication not only includes more diverse members of the group into the decision-making process but also relies on inter-personal trusted connections. Both aspects increase the quality of output based on such lateral communication and information integration. Information that originates from a trusted source is interpreted differently than information from a stranger. Trusted relationships are based on reciprocal loyalty and repeated interactions (Keck and Sikkink, 1998; Powell, 1990). This promotes joint evaluation of the information. If member A knows member B has a specific set of skills and can contribute to his own work, and if they trust each other based on previous interactions, they can work together to reach a better outcome at greater speed (Podolny and Page, 1998, p. 62).

This is related to the advantageous innovative capacity of decentralized organizations. Research found decentralized organizations to be better at innovation and facilitating organizational learning (e.g., Keck and Sikkink, 1998; Podolny and Page, 1998; Powell, 1990). Knowledge is said to diffuse faster in decentralized organizations than in centralized ones, allowing individual members to learn quickly about opportunities and threats (Eilstrup-Sangiovanni and Jones, 2008, p. 16). In centralized organizations the distribution of information needs to be controlled by the central authority. This might neglect the full potential of the members of the group and also potentially overwork the central authority. Decentralized organization, therefore, decreases the workload of the leadership and the organization's overall dependence on the quality of its leadership.

Disadvantages of decentralization

Decentralized organizations have been found to be good in disseminating information within the organization. In the previous paragraph I illustrated how horizontal communication can contribute to the organization producing better output. However, Watts (2004) finds that distributed organizations perform worse than centralized organizations as they lack a central entity that catalogues the knowledge and distributes knowledge and information in an efficient way to all members. They need to receive the information in order to work at the top of their game. In decentralized organizations information might travel laterally, but it is un-coordinated. There is no guarantee that information reaches the intended member and that it reaches said member in a timely manner. A central authority that coordinates communication and information distribution can circumvent such disadvantages.

Another disadvantage is ineffective decision-making (Eilstrup-Sangiovanni and Jones, 2008, p. 21). Literature focusing on the advantages of decentralization highlights decentralized organization's ability to be flexible and adapt dynamically to a changing environment. However, the structural intricacies of decentralized organizations are unlikely to be as dynamic as argued. Terrorist groups need to make decisions "regarding resource allocation, tactics, whether and when to use violence, what social and political levers to manipulate, and so on" (Eilstrup-Sangiovanni and Jones, 2008, p. 21). Powell points out that due to a lack of central guidance and authority the decision-making process in decentralized organizations is probably slow and complicated (Powell, 1990, p. 318). The lack of control over people and their decisions can lead to inconsistencies in the decision-making process potentially harming the strategic goal of the terrorist group and damaging its credibility in the eyes of the supporters. Each member of a terrorist group may have private objectives alongside the collective goals. Delegating decision-making power to individual members without vertical control allows them to act according to their private incentives. Consequently, resources might be used inefficiently, tactics are contradictory and costly to the overall group objective, and private short-term gains trump the long-term success of the terrorist group (Eilstrup-Sangiovanni and Jones, 2008, p. 21).

Considering that delegation occurs also along functional roles, members possess specialized skills and knowledge introducing additional sources for inconsistency. They might not coordinate with other divisions, making decisions based on incomplete information. Furthermore, having to make the decision on their own might overwhelm some members. This might lead to inert decision-making, depriving the terrorist group of acting to their full potential, or maintaining the flexibility needed to survive and strive in a changing and challenging environment.

While one advantage of decentralized organizations is the scalability of recruitment and structural

adaptability, illicit organizations face some crucial limitations (Eilstrup-Sangiovanni and Jones, 2008, p. 23). As clandestine organizations, terrorist groups need to prioritize trust and loyalty between their members. This limits the size of terrorist groups and restricts their recruitment activities (Eilstrup-Sangiovanni and Jones, 2008, p. 23). Trust is easier developed in small communities (Thompson, 2003) and people are more likely to know many or all members that carry out activities together instead of delegating tasks to some stranger. The social distance between the members of a group is small, which promotes trust relationships. Since clandestine organizations heavily rely on inter-personal trust relationships the adaptability of decentralized terrorist groups is restricted. Since those relationships are rooted in familial ties, it is difficult to cut those connections even if they are no longer required (Podolny and Page, 1998, p. 61-62). Those relationships are oftentimes linked to a specific location, making geographical expansion difficult.

Research on network formation suggests that trust is more easily generated in homogenous organizations (Igarashi et al., 2008). Illicit organizations capitalize on preexisting social relationships to recruit friends and family members. Those groups share a similar outlook on culture, challenges, and reasons to engage in illegal activities and terrorism (Erickson, 1981; Klandermans, Kriese and Tarrow, 1988; Raab and Milward, 2003).[16] In his study about the Mujahedeen network of AQ, Mark Sageman (2004, p. 113) finds that at least 75 % of fighters have preexisting ties to family members or friends who were already part of the network. Such familial ties can also restrict the amount of new information and resources flowing into the organization.

The compartmentalization of cells restricts members exchanging knowledge only within their cell, impeding their chances to learn from the experience of others (Kenney, 2007, p. 115). Lacking communication and exchange between cells in decentralized organization increases the compartmentalization and restricts the group's capacity for innovation and learning. This restriction is enhanced as decentralized organizations lack the central repository needed to conserve knowledge over time (Levitt and March, 1988). As a consequence, the skills and experiences disappear with the members possessing them leaving the organization voluntarily or by being captured or killed. A central entity can collect, store, integrate and distribute knowledge functioning as an organizational memory.[17]

More generally, in-fighting is more likely in decentralized organizations (Eilstrup-Sangiovanni and Jones, 2008, p. 27). Local decision-making in decentralized organizations enhances a terrorist group's responsiveness to local challenges and it promotes collective-action issues that stem from coordination

[16] Generally, the importance of trust depends on the severity of the crime committed. The more dangerous and risky the activity the more clandestine organizations rely on trusted networks of people (McFarlane, 1999, p. 53). Considering the risk inherent to terrorism that is facing the constant risk of disruption, terrorist groups are expected to prioritize trust and loyalty over the expansion of their organization (Crenshaw, 1985).

[17] This mechanism is empirically explored in chapter 6.

problems. Without central coordination a decentralized terrorist group lacks coherent resource allocation mechanisms and tactical guidance resulting in diminishing operational and organizational capabilities of the terrorist group as a whole. In addition, without a local authority that coordinates and monitors local divisions, challengers are more likely to rise up to threaten the cohesion of the group.

Collective action problems arise more frequently the longer the geographical distance between the members of the terrorist group. Eilstrup-Sangiovanni and Jones (2008, p. 28) content that decentralized terrorist groups face obstacles due to misunderstandings that emerge without face-to-face interaction. Communication that is only conducted via impersonal messaging such as e-mail, voice transmissions, or instant messaging is prone to misinterpretation and misjudgment (Hinds and Bailey, 2003; Hinds and Mortensen, 2005). A central hub not only ensures efficient decision-making, but it can also provide individual members with a central base where they can meet, train, and coordinate activities. The lack of such a hub might increase the security of a terrorist group, but it promotes the likelihood of local solo action and decreases social cohesion between the members of the terrorist group (Eilstrup-Sangiovanni and Jones, 2008, p. 29). Until security forces reclaimed the territory occupied by the IS, their self-proclaimed caliphate attracted individuals from all over the world to go there and join their organization. There they would train together, carry out military operations, and develop a social bond to the collective purpose of the group (Dearden, 2016). With the loss of this territory, people no longer travel there but radicalize at home and carry out attacks close to where they live. The tactics are chosen by the individual attacker, which does not guarantee a unified strategy. As such, the attackers match the tactic to their abilities.[18]

To summarize, both decentralized and centralized organizations provide benefits to terrorist groups. Terrorist groups face existential danger from a myriad of sources. They are actively fought against by an enemy government against which a decentralized organization provides increased resilience. However, the need for loyalty and trust established in close personal relationships might limit the abilities of a terrorist group to decentralize. Terrorist groups need to mobilize support on an ideational and more material level, which may also require them to stand their ground against potential contenders. Failing to meet those ends can ultimately threaten the survival of the group. They need a coherent strategic vision and tactical consistency. Here, greater centralization is advantageous as it enhances coordination and accountability between the individual members of the group. The need for strategic cohesion and tactical consistency challenges the advantages of the decentralized organization in flexibility, scalability, and resilience. Therefore, there is no ideal form of a group's organizational structure. Terrorist groups have to understand and mitigate the respective risks associated with their existing organizational structure.

[18]This exemplifies the argument I make in this dissertation.

3.5 Summary

Table 3.2 summarizes the key focus of my dissertation. It provides an overview of key concepts and key characteristics for each focal component in my theory. I build on existing theories of strategic management and apply the concepts to analyzing terrorist groups.

Table 3.2: The economic market of terrorism

Focus	**Key concept**	**Key characteristic**
Unit of analysis	Terrorist group	Economic organization
Source of variation	Resources	Tradability
Acquisition	Exchange relations	Relational rents
Allocation	Efficient management	Centralization

My unit of analysis is the terrorist group. I conceptualize it as an economic entity and as an organization. This allows me to use organizational theories to explore the behavior of terrorist groups. While it is nearly impossible to study terrorist groups' internal dynamics due to its secretive nature, focusing on organizational idiosyncrasies enables me to explore behavioral differences as a function of group-internal dynamics. In addition, I assume that each terrorist group has to be an economic actor. Each terrorist group needs to ensure a supply of resources to carry out attacks. The source of variation in terrorist groups' performance lies within the resources that each terrorist group has at its disposal. Several conceptualizations of terrorist groups' resources exist. I provide a novel classification referring to economic theories of resource-dependence and resource exchange. I define resources based on their tradability, focusing on the opportunity to acquire resources from their environment. Shifting the focus onto terrorist groups' exchange relations, I argue that they can reap relational rents. They achieve a higher performance when cooperating with other actors in their environment. Building on network theory, I discuss how terrorist groups can enhance their performance by engaging in cooperative exchange relations. I also argue that terrorist groups need to be able to efficiently manage their resources. Terrorist groups that are better at managing their resources can achieve a higher performance. Using organizational theory, I build an argument based on the organizational structure of terrorist groups arguing that centralized terrorist groups are superiorly managing their resources.

I offer a novel approach to studying the behavior of terrorist groups by analyzing the terrorist group in interaction with its environment. The environment offers a terrorist group access to resources. It also defines the conditions, in which a terrorist group needs to operate and survive. The environment

influences the organizational structure of a terrorist group, which, consequently, influences a terrorist group's performance.

I explore three empirical mechanisms to study how the resourcing process affects how a terrorist group can conduct attacks. First, I explore how terrorist groups design their organizational structure given certain environmental conditions (chapter 4). I argue that terrorist groups match their organizational structure to the environmental conditions. Second, I explore terrorist groups' involvement in organized crime (chapter 5). Since terrorist groups can generate a substantive amount of revenue by engaging in organized crime, I study the predictive capacity of several environmental and organizational factors combining both group-internal dynamics and terrorist groups' interactions with their environment. Finally, I explore the operational performance of terrorist groups and to what degree they are affected by patterns of cooperation between terrorist groups (chapter 6). Focusing on relational rents, I argue that terrorist groups exchange resources with other terrorist groups. I assess the effect of efficient resource allocation on the operational performance of terrorist groups by testing whether centralized terrorist groups perform better than decentralized groups and whether the organizational structure of a terrorist group mediates its external resource acquisition.

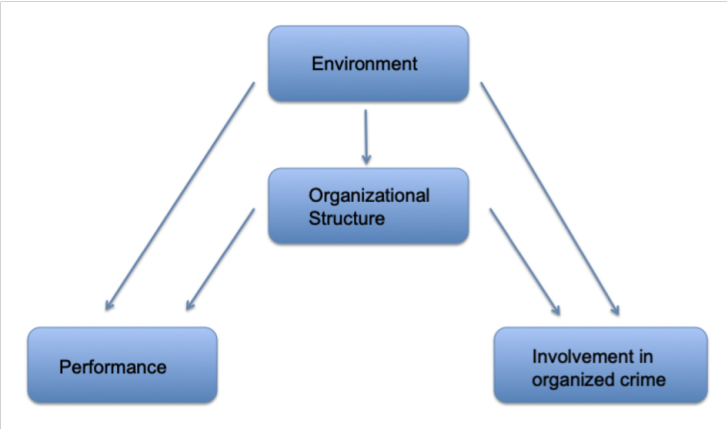

Figure 3.1: Theoretical framework

Figure 3.1 illustrates the theoretical framework graphically. I elaborate the individual theoretical mechanisms in the empirical chapters and derive testable hypotheses. I also provide specific details on the research design for testing the implications of my theory in the respective empirical chapters.

Chapter 4

The environmental effect on the organizational structure of terrorist groups

> *"An organization cannot evolve or develop in ways which merely reflect the goal, motives or needs of its members or of its leadership, since it must always bow to the constraints imposed on it by the nature of its relationship with the environment" (Sadler and Barry, 1970, p. 58).*

4.1 Introduction

Why does the organizational structure of terrorist groups vary between centralized and decentralized structural designs? In this chapter, I focus on the effect that the environment of a terrorist group has on the organizational structure of the group. While previous research focuses primarily on the security environment of terrorist groups linking their organizational structure to counter-terrorism pressures (Sageman, 2004; Pace, 2014), I argue that this analysis is incomplete. I do not dispute that high counter-terrorist pressure leads to terrorist groups adopting a more decentralized structure to decrease their likelihood of being detected, infiltrated and disrupted to the point where they cannot function anymore (Helfstein and Wright, 2011; Eilstrup-Sangiovanni and Jones, 2008; Podolny and Page, 1998; Sinno, 2008). However, I argue that we need to consider more than just security constraints when we want to understand the organization of terrorist groups. If security concerns were the only factor terrorist groups consider, there should not be any observable anomalies.

Most of the Northern Irish terrorist groups had a centralized structure even though the United King-

dom has a very high counter-terrorist capacity. Also, we should not observe any within-country variation. This deviation from theoretical expectation cannot be explained by theories linking counter-terrorist pressures to the organizational structure of the terrorist groups alone. Out of the 48 countries that are part of the sample studied here, 23 of them host centralized and decentralized terrorist organizations.[1]

Another approach expects terrorist groups to no longer needing to have centralized structures, since modern communication technology allows for remote planning and coordination of the attack as much as the remote recruitment and training of the attackers (Crenshaw, 2008; Jenkins, 2006). They attribute this development to the availability of new communication technology that allows for a larger distribution of the organization without sacrificing coordination capabilities. Moreover, the prevalence of decentralized terrorist organizations today can be implicitly linked to a decentralized resource acquisition strategy. Faced with a substantial loss of state funding after the end of the Cold War and again after 9/11, terrorist groups need to adapt to not having a central supporter. As resources become more decentralized, terrorist groups need to accommodate their organization to minimize operational inefficiencies (Laitin and Shapiro, 2008). As the market in weapons and information about the production of weapons has globalized and modern communication technology is available to be used by everybody, local networks without central directions are given the opportunity to take autonomous action in the name of a broader organization (Laitin and Shapiro, 2008, p. 224). However, the data show that even in the years after 2000, more than half of all newly founded terrorist groups are structured centrally. The determinants for that pattern need to be explored more thoroughly.[2] The question remains: *Why do some terrorist groups adopt a centralized organizational structure, while others do not?*

This study highlights the relationship between the terrorist group's environmental conditions and its organizational structure. I discussed the advantages and disadvantages of organizational designs in chapter 3. Based on this discussion, I claim that the most efficient organizational structure for a terrorist group is a centralized one. But some terrorist groups adopt a decentralized structure. This study investigates specific factors that can explain those deviations from the ideal type of a centralized organizational structure. I focus on the conditions introduced by the environment. Those factors are external to a terrorist group. Internal factors constitute all those elements that a terrorist group can control. Previous research discusses, for example, regional scope (Ohlheiser, 2014), the incorporation of multiple goals (Pace, 2014) or attack type (Abrahms and Potter, 2015) to be affecting the organizational structure of terrorist groups.

[1] In India, for example, there are 29 terrorist groups, of which 11 have a decentralized structure and 18 are organized centrally.

[2] Of all newly founded terrorist groups after 2000 in the sample, 49 % adopt a decentralized organizational structure and 51 are organized centrally.

Additionally, the data on environmental variables are generally more precise and reliable than data on internal variables. Moreover, external factors can be observed across various countries and over an extended period of time, rendering any conclusions drawn from their analysis more transparent and reliable.[3] Previous research that focused on organizational structure of terrorist groups mainly used it as an explanatory variable for a terrorist group's violence profile in general (Heger, Jung and Wong, 2012) or for the choice of particular tactics (Abrahms and Potter, 2015). My argument in this chapter specifies the relationship between the environment and the organization, as it links resourcing opportunities and security concerns to structural designs.

I argue that a terrorist group adopts a specific organizational design after assessing how the ideal organizational structure needs to look like, given the environment it operates in. Depending on the environmental conditions, a terrorist group has more or fewer opportunities to mobilize resources or to adopt a broader repertoire of functions. I analyze the effect of a state's security measures on the organizational structure of a terrorist group. I assess the effect of a state's military capacity to capture the general capability of a state to counter terrorist groups in their territory. Additionally, I evaluate the effect of repressive activities capturing the willingness of a state to use violence against non-state actors on their territory. Being faced with such security challenges, terrorist groups need to capitalize on the opportunities provided in their environment. Depending on the opportunities, terrorist groups can mobilize the population to support their organization or generate financial and material resources. I focus on the existence of other terrorist groups in the country and the degree of ethnic fractionalization to explore those opportunities. My approach captures both the restrictions and the opportunities that lie within a terrorist group's environment.

Group-dynamics can also affect the organizational structure of terrorist groups. A comprehensive approach concerning the research on terrorist group's organizational structure ultimately needs to combine external and internal factors to fully understand why terrorist groups organize in the way they do. I rely on ideology as one internal factor that can be evaluated from the outside. Ideology is publicly communicated by the terrorist group and can be used to infer their political goals and strategic intentions.[4]

As I show below, my findings suggest that environmental conditions influence the organizational structure of terrorist groups. The results show that the state capacity to repress and also the willingness to repress increase the likelihood of a terrorist group being decentralized, supporting previous findings (Helfstein and Wright, 2011). My research highlights that it is important to focus on the activities that terrorist groups do. Many groups extract resources from the population. Moreover, they can also provide

[3] Accepting the limitations of internal data, understanding the effect of environmental conditions on a terrorist group's organizational structure is even more relevant.

[4] Other group-internal factors are, for example, organizational size, territorial control, or organizational age.

public goods for their constituency. The results indicate that in countries, where terrorist groups need to coordinate between multiple ethnic fractions, the likelihood of having a centralized structure increases. During the Cold War, when many terrorist groups were funded by states to operate as their proxies in conflicts, they were also more likely to adopt a centralized organizational structure. Terrorist groups that follow a maximalist ideology are less likely to be centralized, suggesting that those terrorist groups need to adopt a flexible organizational structure to accomodate its members.

4.2 Organizations as sticky institutions

This part of the dissertation focuses on why terrorist groups adopt either centralized or decentralized forms of governance. I argue that the environmental conditions at the time of organizational formation affect a terrorist group's decision about which structural design it chooses. This argument is based on the assumption that one organizational style is more functional and desirable at a specific point in time given the prevalent conditions (Podolny and Page, 1998, p. 68). Findings on structural inertia support this approach. Hannan and Freeman (1984, p. 151) argue in favor of structural inertia claiming "the speed of reorganization is much lower than the rate at which environmental conditions change." Building on Stinchcombe's (1965) arguments of organizational stability, the structure of an organization is established during its early days and difficult to change (Podolny and Page, 1998, p. 68). Stinchcombe (1965) notes that the organizational structure is stable, because it tends to become institutionalized and holds a value that goes beyond technical or economic efficiency. As such, a certain organizational structure may favor the position of individuals within the organization resulting in an organizational design that is more stable than it should be in changing conditions. Podolny and Page (1998, p. 68) offer examples from the computer industry, in which firms that started their business years ago display a high level of vertical integration, whereas younger firms are less vertically integrated due to shifting market conditions. Instead of adapting to the new conditions, the older firms stick to their older structural designs.

Organizations refrain from structural reform because it is costly. Davis and Powell (1992, p. 333) claim that change threatens the interests within the organization. Reorganization includes a redistribution of power in the organization. Members who stand to lose in the process of change might act against it. This is even more relevant as those members that have the most to lose are usually those who have the most resources to work against change. Moreover, even if an organization manages to change the structural design, its continued success is not guaranteed (Davis and Powell, 1992, p. 333). Davis and Powell (1992, p. 333) state, "attempts at reorganization lower the organization's reliability,

increasing the probability of organizational death, and the risk increases with the time it takes to accomplish reorganization." Terrorist groups might, thus, refrain from structural reorganization. Infighting decreases their operational and organizational capacity, decreases tactical and strategic cohesiveness, or leads to organizational splits. Decreasing cohesiveness and organizational infighting can lead to operational mistakes or unnecessary risk-taking. Therefore, it can also increase the visibility of the terrorist group, enhancing its vulnerability to disruption and threaten group survival.

Davis and Powell (1992, p. 333) assert that organizations lose much of their accumulated knowledge stored within the old structure if reorganization happens. This forces them to face again the 'liability of newness' (Stinchcombe, 1965; Hannan and Freeman, 1984). Interpersonal relationships are broken up and new ones need to be established. For clandestine organizations, such as terrorist groups, this is a substantive obstacle to reorganization. As elaborated in chapter 3, personal relationships between members of terrorist groups are based on loyalty and trust - two attributes that are crucial for maintaining the optimal functionality of terrorist groups. These attributes need time to develop and are lost when ties are severed in the process of reorganization. This might impede the functionality of a terrorist group and threatens their survival. Moreover, since members of a terrorist group are often related through kinship or friendship, severing those ties might not even be possible.

Taken together, these observations underscore my line of argument that terrorist groups establish their organizational structure when founding the group and are unlikely to change it in the future.

4.3 Which structure to adopt?

Glazer and Weiss (1993) state that there is no universally best structure because it depends on the environment. They argue that contextual factors constrain the organizational structure of firms. Child (1972, p. 8) explains that "these constraints are assumed to have force because [...] organizations must achieve certain levels of performance in order to survive. If organizational structure is not adapted to its context, then opportunities are lost, costs rise, and the maintenance of the organization is threatened." This notion of environmental effects on the organization go back to contingency theory, which claims that the best way for an organization to organize depends on the nature of the environment that it needs to adapt to (Lawrence and Lorsch, 1967; Scott, 1981). Contingency theory suggests that organizational performance is achieved by matching organizational contingencies with structure (Donaldson, 2001).

Following the discussion of advantages and disadvantages of decentralization in chapter 3, I content that in an ideal world, terrorist groups centralize their organization at least to some degree as it enhances their overall performance. An ideal environment 1) is free from state repression, 2) contains opportunit-

ies for mobilizing resources, and 3) provides terrorist groups with a void of governmental control which it can take over and assume functions to increase its legitimacy in the eyes of the population. From this perspective, centralized terrorist groups are better at the production of violence. Previous research supports my claim (Eilstrup-Sangiovanni and Jones, 2008; Podolny and Page, 1998). Heger, Jung and Wong (2012, p. 745) argue that the functional specialization within units positively impacts an organizations lethality. They argue that 1) a clear chain of command and control to coordinate the efforts of various parts of the organization, 2) the accountability between functional units, and 3) central control each supports the positive impact of functional differentiation on the organization's lethality. Those characteristics of a centralized organization maximize a group's ability to translate resources of all kinds into violence. Given the observable variation in organizational designs, the question remains why some terrorist groups deviate from such an ideal structure.

Illicit organizations have been found to choose their organizational set-up based on a strategic deliberation given their respective resources and their functional goal (e.g., Easton and Karaivanov, 2009; Tremblay, Bouchard and Petit, 2009). Tremblay, Bouchard and Petit (2009) analyze the structure of Hells Angels, finding that they decentralize tasks and operations since they wish to enhance the geographical scope of their trafficking operations, but are constrained by their limited size of membership. Easton and Karaivanov (2009) analyze the optimal crime network structure in response to alterations in a specified set of costs and benefits. They find that certain strategies to counter crime are ineffective in cases where the crime network is aware of measures and can adopt their structure accordingly. They give the example that removing the 'key player' from the network might be ineffective when accounted for by the crime network endogenously. This finding matches network theory, which argues that built-in redundancy can increase a network's resilience to external shocks (Eilstrup-Sangiovanni and Jones, 2008; Podolny and Page, 1998).

Previous literature and anecdotal evidence suggest that in an environment that is beyond the reach of government authorities, terrorist groups can coordinate their activities without fearing discovery and disruption (BBC, 2016; Sinno, 2008). Some terrorist groups control such safe havens. Terrorist groups use political instability in a country to undermine institutionalized structures and counter-initiatives. As such, IS first set up operations in Iraq, which was left with a power vacuum after U.S. troops retreated without a stable Iraqi government in place (Johnston et al., 2016). Another example is al-Qaeda, which in the 1990s had moved the base of its organization to Sudan to be free from repression (Sageman, 2004). While those territories outside any governmental control exist, states can be better and worse equipped to deal with violent opposition groups within their borders. As clandestine organizations, terrorist groups are required to maximize their organizational security by adopting an organizational structure that is

resilient to interdiction. States that are good at countering terrorist groups can increase "the degree of threat that faces the organizational decision-makers in the achievement of their goals" (Child, 1972, p. 4).

4.3.1 Case examples

My research is informed by various instances of terrorist groups matching their organizational structure to the environmental conditions. In the following, I briefly describe cases of terrorist groups providing motivational evidence for my research. First, I discuss the case of the so-called Islamic State (IS). Second, I elaborate on two terrorist groups that use organized crime to fund themselves. Those descriptions do not attempt to provide an empirical test of the argument, but rather provide case-based specific examples to support a purported trend. Most terrorist groups do not change their organizational structure over the course of their life. Some groups, however, manage to adjust their organization to tremendous changes in their environment to ensure their survival and performance. Exploring those cases in more detail allows me to hone in on the specific mechanisms of how environmental conditions affect the organizational structure of a terrorist group.

The most recent case of IS is very informative. Over the course of the past years, many documents were discovered reporting governance structures in great detail (Johnston et al., 2016). In 2013, IS started to rise in Iraq and Syria. Its members included the rank and file of Saddam Hussein's government and military apparatus. It adopted a state-like structure to fill the vacuum created after the U.S. invasion (Johnston et al., 2016). It established a hierarchy not unlike that of a regular state. This structure included pseudo ministries, which were led by individuals that were responsible for their departments and reported to the leadership of the group. IS was very prone to extracting resources from its environment. It had access to oil fields, antiquities, and weapons (Johnston et al., 2016). It complemented those resources by taxing the population in their territory (Johnston et al., 2016). IS also provided a great variety of public goods to the population in their territories. It offered education, health care, and employed people as 'civil servants' (Johnston et al., 2016). Moreover, it established a court system and processed people disobeying their laws (Johnston et al., 2016). Thus, the Islamic State is a highly centralized organization, which has control over many functions of social life beside their military actions. It also attracted many supporters from all over the world, who were willing to move into the territories controlled by the group. Also, IS expanded its operations to Syria, again profiting from the lack of governmental authority, which allowed IS to step in to appropriate the state's functions.

In 2017, IS faced a different environment. The level of repression on IS by the coalition forces had increased extensively as the international coalition increased their efforts to eradicate IS in Iraq

and Syria. As a result, the group lost most of its territories and the funding opportunities that came with them (Riley, 2017). It no longer controled any oil fields. It also stopped providing public goods to its 'citizens' (Schorzman, 2016). It only provided military resistance and has shrunk to only a few committed fighters. Facing this new context, it changed its strategy from establishing a state in a distinct territory to committing terrorist attacks worldwide. To meet the demands of such a strategy, it went from a strictly centralized structure to one relying on coaching and inspiring individual cells of individuals sharing their ideology (Schmitt and Kirkpatrick, 2015). Facing the increasing repression of its organizations and the crumbling support of the population, it needed to adapt if it wanted to keep the movement alive. However, it was not only the physical pressure on its organization that forced it to decentralize its organization and operation. It also did not need to maintain a broad repertoire of functions. It no longer provided any services to its population, given that it did not have any physical resources to extract and sell any longer.

Research has also shown that the organizational structure accommodates the requirements of specific resource mobilization strategies (Eccarius-Kelly, 2012). Terrorist groups also fund themselves by engaging in organized crime, ranging from the cultivation and trafficking of drugs, the mining of gold or diamonds, to exploiting natural resources. They traffic humans, weapons, wildlife or antiquities; use extortion, fraud and money laundering (e.g., Collier and Hoeffler, 2004; Felbab-Brown, 2010; Lujala, 2010; Ross, 2006; Saab and Taylor, 2009; Vittori, 2011). Eccarius-Kelly (2012) provides case-study evidence that terrorist groups decentralize their organization to accommodate the logistical challenges of being successful in the illegal drug trafficking business. She compares the Kurdish Workers Party (PKK) to the Armed Revolutionary Forces of Colombia (FARC), finding that both create specialized units to deal with drug trafficking. Still, those groups did not fully abandon their centralized structure but rather created 'tentacles' reaching out from the center to complete various tasks. Those parts acted in large parts independent from each other, but they were accountable to the central authority, which coordinates the activities. This adds evidence to my claim that terrorist groups are reluctant or unable to undergo extensive structural reform. It also highlights their responsiveness to the environment. Given the possibility of engaging in drug cultivation and trafficking, those groups needed to match their organizational structure to manage the added functional requirement.

The environmental complexity also affects the structural organization of terrorist groups. Child (1972, p. 3) defines environmental complexity as "the heterogeneity and range of environmental activities which are relevant to an organization's operations." It captures all those efforts that a terrorist group has to undertake to extract potential resources from its environment. The more resources are potentially present within a terrorist group's environment, the higher is the environmental complexity.

Terrorist groups need to find resource generation strategies to extract as many resources as possible. In an environment where terrorists can only access few resources, i.e., taxing the population or engaging in common crime, the challenges of organizing the resource extraction and to process those resources are smaller. It becomes more difficult the more diverse resources a terrorist group can extract from their environment. This means that when faced with a complex or multidimensional resource space in their respective environment, terrorist groups have to adapt their structure to be able to handle this complexity and to not let potential resources, which might be beneficial for the overall achievement of their goals to be wasted.

Additionally, Felbab-Brown (2010) argues that insurgent groups that engage in the production and trafficking of illicit goods can create political capital. Following her rationale, terrorist groups that engage in such illicit economies can generate popular support by employing the local population in their business activities and by protecting them from violent rivals threatening the population's survival and economic lifeline. Engaging in illicit activities is not only a way to mobilize resources, but also to create supporting ties between the terrorist group and the population. However, such ties come with the responsibility not to destroy them and maintain operations in the interest of sustained support. This requires some degree of central coordination to constrain deviant behavior.

Those examples describe terrorist groups as they match their organizational structure to the environmental conditions. In order to maintain their organization they need to stay hidden from government repression, while at the same time mobilize resources to stage attacks. The more opportunities terrorist groups have to generate resources the more they need to coordinate their actions. All groups discussed have established specialized sections to deal with the logistical intricacies of those activities, but all maintained central control and coordination over those activities. The examples also highlight the connections a terrorist group has to its constituency. Depending on the quality of this connection, a terrorist group has to broaden its functional repertoire. It may not be enough to carry out attacks, but it also has to provide other goods and services to the population. In the following section, I use this case-based evidence to formulate a general theoretical argument that I then use in a large-n approach to identify global trends.

4.4 Environmental explanation of organizational structure

Terrorist groups operate in different environmental conditions. I investigate the conditions under which terrorist groups adopt a specific organizational structure. While for some terrorist groups the centralized structure is optimal, for some it is the decentralized structure. Stern and Modi (2010) find that

organizations adjust to a non-favorable environment by maintaining an adaptive mechanism to survive in a competitive environment. I employ a political opportunity model arguing that a terrorist group's opportunity to freely go about its business is constrained by the conditions of the environment in which it operates. The environment of a terrorist group introduces uncertainty about the interactions with other actors, ranging from a supporting population and the target audience to more tangible interaction with competitors or state and non-state benefactors. A terrorist group needs to function within this context. It needs to mobilize resources, coordinate independent tasks, and it needs to deliver some output.[5] Following this rationale, I argue that the organizational structure of a terrorist group needs to implement features to reduce uncertainty, while capitalizing on present opportunities.

Increasing governmental pressure on the organization itself but also on other parties with whom the terrorist group interacts, increases the level of stress for the terrorist group, which also decreases its operational possibilities. Increasing pressure on terrorist groups leads to their decentralization, because they need to structure in a way that does not lead to the total collapse of the organization in case of a strike against them (Eilstrup-Sangiovanni and Jones, 2008; Helfstein and Wright, 2011; Raab and Milward, 2003). Cronin (2009) observes that leadership decapitation is not effective in cases of a decentralized organization with distributed functions and roles, since they include enough redundancy to replace someone in case one person gets removed from the organization being captured or killed. A similar logic applies to randomly targeting members of the organization. The likelihood of capturing a member in a vital position is smaller in a decentralized organization, and even if someone is captured, redundancy ensures someone to step in and bridge this gap. Also, captured and interrogated members can only tell others about their immediate contacts, not knowing the entire structural layout and hierarchy of the organization. Oftentimes, members do not know the location of the person in charge or even his or her true identity. After the attacks on the World Trade Center in 2001, Osama bin Laden explained in a video "those who were trained to fly didn't know the others. One group of people did not know the other group" (Michael and Wahba, 2004).

In this respect, the environmental freedom available to a terrorist group is determined by the counter-terrorism capacity of the state in its home country and the state's ability to repress violent movements. Being a clandestine actor operating underground, high counter-terrorism capacity restricts a terrorist group's freedom to move around and go about its business. In contrast, in a state with low counter-terrorism capacity, a terrorist group faces less existential danger and can operate more freely.

[5] Some terrorist groups have a militarized and a non-militarized section. They need to produce attacks, but some also need to deliver social services.

Hypothesis 1 (Ability to repress): The higher the ability of a government to repress a terrorist group, the less likely it is that a terrorist group adopts a centralized organizational structure.

I differentiate the ability to repress from the willingness to repress. Not every country that has a police force and military apparatus at their disposal decides to actively engage terrorist groups. Furthermore, a government can choose to employ different strategies to counter terrorism in their country. It can adhere to the rule of law and legitimate institutions or it can decide to use more radical forms, including torture, political disappearances or extrajudicial killings. I assume the same considerations concerning the terrorist group's security to hold when faced with such activities.

Hypothesis 2 (Willingness to repress): The higher the willingness of a government to repress a terrorist group, the less likely it is that a terrorist group adopts a centralized organizational structure.

Oftentimes, terrorist groups are not the sole violent group in the country. The more terrorist groups there are present in one country, the higher is the chance of them interacting.[6] Terrorist groups in the same country can either represent the same constituency or they can cater to different audiences. Moreover, they can collaborate or compete with each other. Anecdotal evidence provides numerous examples of terrorist groups whose existence is threatened by the competition with other terrorist groups fighting within the same environment.[7] Additionally, many terrorist groups have worked together. The ongoing Syrian civil war provides numerous examples of both phenomena. Depending on the ever-changing conditions of the conflict, allegiances are broken and new ones are formed (Zorthian, 2015).

I expect the potential interaction with other terrorist groups in a country to positively correlate with the likelihood of terrorist groups adopting a centralized organizational structure. Terrorist groups which experience competition from other terrorist groups need to strengthen their operational capability. In order to succeed and outperform competing terrorist groups, they need to constantly produce terrorist attacks. The moment in which a terrorist group stops conducting attacks in a highly competitive environment, it loses followers to other groups. In such an environment, a terrorist group cannot afford to leave resources unused due to inefficient resource allocation.

[6] I am aware that, potentially, there are many divers actors which use violence to achieve their goals. They may cover the entire spectrum ranging from criminal organizations to rebel movements. Terrorist groups can interact with all of them in various capacities. For matters of comprehensiveness, I restrict the argumentation to interaction between terrorist groups.

[7] AQ lost a significant amount of supporters and affiliates to IS. Throughout the Maghreb, dissatisfied AQ movements pledged allegiance to IS. Boko Haram in Nigeria and Ansar Beit al-Maqdis in Egypt became official provinces of the IS. Before, those two terrorist groups were following AQ. In the fallout of those changing affiliations, those groups experienced fractions splintering from the original group and now fight in the same regions for recognition, supporters, and resources (Watts, 2016).

Moreover, especially when being challenged by competitors, a terrorist group needs to ensure to be communicating a consistent narrative to their audiences. It needs to communicate strategic consistency to its constituency in order to convince them to provide support to the one group that combines enough strategic and tactical foresight, professionalism, and resolve to pursue a communal goal. Those qualities make it worthy of their support. It also needs to be consistent in its actions to strengthen its position vis-à-vis the government (Arreguín-Toft, 2001). A terrorist group needs an authority that provides the direction of the group. Thus, when located in a highly competitive environment, a terrorist group is required to adopt a centralized structure to efficiently allocate their resources and to communicate a consistent narrative.

The more terrorist groups exist within a shared geographical space, the more likely it is for the groups to engage in cooperation with each other. When terrorist groups collaborate, they intent to complement and pool their resources to expand their operational repertoire (Phillips, 2012). It is in the interest of a rational terrorist group to exploit all potential resources in its environment that enhance a terrorist groups capability. However, no matter how short-term and non-institutionalized the exchange is, terrorist groups increase their vulnerability as collaboration increases their visibility to outside actors. As terrorist groups try to minimize their exposure and to not endanger their organization, it is reasonable to assume that they only engage with other terrorist groups if they can maintain a professional organization of the business exchange. If a terrorist group can rely on the other actor to meet the agreed upon terms and to not act unexpectedly or disorganized, the threat to the own organization can be minimized. This argument is in contrast to the common line of argument in the literature, which argues that when the exposure and danger to a clandestine organization increases, they are more likely to be decentralized (Bakker, Raab and Milward, 2012). I argue that in cases where terrorist groups interact with each other to reap the benefits from cooperative exchange, professional behavior is key to a successful relationship.[8] This is also a quality that is acknowledged by criminal cartels. The Italian Mafia, one of the most sophisticated criminal organization, and the Islamic State collaborated to traffic oil (Willan, 2017). Both organizations are very professional, possess the ability to carry out such transactions, and want to reap the financial benefits from the trafficking operation. Given that terrorist groups tend to take advantage on the resource pool in their environment, they are expected to adopt a centralized organizational structure. This communicates a certain degree of tactical and strategic guidance by a central authority to potential cooperation partners ensuring a certain degree of professionalism.

[8] Analyzing data that is used in chapter 5, I find that of those terrorist groups, which cooperate, 71.3% are centralized, while only 28.7% are decentrally organized. This correlation provides initial support for the intuition of the argument.

Hypothesis 3 (Interaction): The higher the potential for interaction with other terrorist groups that are located in the same country, the more likely it is that a terrorist group adopts a centralized structure.

The next mechanism draws on social divisions within a country. I argue that in a country where ethnic fractionalization is high, terrorist groups are more likely to be centralized. Terrorist groups can capitalize on the grievances of some ethnicity adjusting their strategic narrative to mobilize support. They can provide services to communities, which may be neglected by government authorities, and they may even be able to hide among their population, thus creating a type of safe haven, which may or may not fall within some territorial demarcations. Following the rationale that terrorist groups aim to maximize their resource pool, it is reasonable to assume that they want to mobilize as many fractions of a society as possible. A terrorist group needs to address the needs of one fraction, while not disregarding those of another. This requires an organization to be able to coordinate its actions in a way that allows to regard different interests. As elaborated in chapter 3, centralized terrorist groups are better at coordinating and orchestrating activities, which do not disregard the interest of parts of the organization. Assuming that the efficient coordination between ethnic fractions becomes more difficult the more fractions there are, I argue that the higher the ethnic fractionalization in a country is, the more likely a terrorist group is centralized.

Hypothesis 4 (Ethnic fractionalization): The higher the ethnic fractionalization in a country is, the more likely it is that a terrorist group adopts a centralized structure.

4.4.1 Alternative explanations

In addition to the mechanisms elaborated so far, I test alternative explanations including both environmental and group-specific factors that might influence the organizational structure of terrorist groups. The organizational structure can be linked to funding opportunities. A substantial amount of terrorist groups are funded by states (Byman, 2005). States might do this either because they support the cause, or because they use terrorist groups as a proxy to further their interests in specific regions. This was especially practiced during the Cold War.[9] The U.S. and the Soviet Union both funded terrorist groups all over the world raising their capacities and building a stronghold against each other's ideologies (Kalyvas

[9]It is still the case after the Cold War. As such, Iran, Qatar, and Saudi Arabia are known supporters of terrorist groups (Callimachi, 2017). All three countries claim hegemony in the Middle East and fund terrorist groups to maintain and increase their influence in other countries. In the ongoing war in Syria, groups that are internationally listed as terrorist groups, are funded by Western countries to fight on all sides of the Syrian civil war (BBC, 2014). However, during the Cold War this pattern was systematically observable (Kalyvas and Balcells, 2010).

and Balcells, 2010). Terrorist groups that were founded during the Cold War are more likely to have a centralized structure for two reasons: First, those groups were supported to be reliable partners in proxy wars. They were trained and equipped to be able to fight the guerilla war against their enemy. This requires a professional and centralized military apparatus. Second, states supply terrorist groups with money and other resources expecting the output to be in their favor. Terrorist groups are accountable to their supporters and need to carry out operations that further their objective (Vittori, 2011). This requires centralized discretion over strategic and tactical decisions.

Hypothesis 5 (Cold War): Terrorist groups that originated during the Cold War are more likely to adopt a centralized structure.

Group-specific dynamics can also affect the organizational structure of a terrorist group. I argue that the ideology of a terrorist group can affect its organizational structure. Terrorist groups that pursue a nationalistic or separatist ideology face different requirements than do those terrorist groups which pursue a maximalist ideology. I argue that terrorist groups which have far-reaching abstract goals that are almost utopian in nature and non-negotiable in practice, are less likely to have a centralized organizational structure. Such goals include, for example, some world-wide implementation of Sharia law or socialist revolution. Their maximalist goals are unlikely ever becoming a reality, since the majority of people do not share the same vision for their society (Abrahms, 2006). They also make negotiation not an option, as the maximal demands would require the complete overthrow of the dominant cultural or political norms (Heger and Jung, 2017).

Such terrorist groups represent only a small fraction of people with the same mindset. The RAF, for example, was not representing large parts of German society, but rather a very small fraction of the entire population. Similarly, only a very small constituency that is very heterogenic and international in its own right supports IS. As a consequence, a maximalist agenda needs to inspire people to commit to the terrorist organization's ideology with whatever they can offer. Rather than needing a central authority to organize an attack, those terrorist groups need to inspire and guide people to carry out attacks at their own discretion.[10] Therefore, there is neither the opportunity nor the incentive to centralize the organizational structure.

In contrast, terrorist groups that pursue a well-defined goal, whose achievement does not resemble utopia but can become a reality, are more likely to have a centralized organizational structure. Such

[10] AQ regularly publishes the online-magazine *Inspire*, in which it calls upon its supporters to fight for them, prints interviews with ideologues and provides practical tips and training for specific operations.

groups have links to a defined part of society. Oftentimes, those groups pursue ethnic or nationalistic self-determination. Terrorist groups that rely on the support of such an identifiable constituency are accountable to their grievances. Their supporters expect those groups to actively pursue the set goals and to not endanger possible solutions with destructive behavior. Those terrorist groups need to install a central entity which coordinates actions and ensures accountability of its members in order to prevent deviant behavior. Such behavior could destroy the trust between the terrorist group and its constituency. If the consituency no longer supports the terrorist group as the actor fighting for their rights, it can threaten the survival of the group. For example, such behavior has destroyed, or at least delayed, peace negotiations. This strategy of spoiling is delaying or sabotaging peace settlements (Kydd and Walter, 2002). Kydd and Walter (2006, p. 73) provide examples from talks between Protestants and Catholics in Northern Ireland, or the Palestinian-Israeli peace negotiations. One faction of a terrorist group commits an attack to signal the fruitlessness of negotiation since those that negotiate the deal cannot control the actions of all members of the group.[11] To prevent such actions, I argue that terrorist groups with a nationalistic/separatist agenda are more likely to have a centralized organizational structure.[12]

Hypothesis 6 (Maximalist ideology): Terrorist groups that pursue a maximalist ideology are less likely to adopt a centralized organizational structure.

4.5 Research design

4.5.1 Data and operationalization

The goal of this study is to assess the correlation between environmental conditions and the organizational structure of terrorist groups. The unit of analysis is the individual terrorist group. External factors can constrain the opportunities of terrorist groups to centralize their organization. The environmental conditions affect how freely a terrorist group can operate in a country, its opportunities to mobilize resources, and the tasks it can assume to increase its legitimacy in the eyes of the population. The goal is to conduct a systematic analysis of the conditions across many cases to contrast and complement the many and very insightful, but limited in explanatory power, case studies (i.e., Gunaratna, 2002; Gunaratna and

[11] Often, this leads to splintering of the organization. The more extreme parts split from the original organization to keep on fighting. This is also a consequence of organizational dynamics (Libicki and Jones, 2008). By signing a peace deal, the terrorist group would abolish itself. Some members are not accepting such fate.

[12] Sometimes terrorist groups still fail in controlling the entire organization. During the Israeli-Palestinian peace process, attacks have spoiled a positive outcome. Responsible for attacks have been splinter factions that disagree with the direction the core organization was going (Kydd and Walter, 2002).

Oreg, 2010; Horgan and Taylor, 1997, 1999). The dependent variable captures whether or not a terrorist group is centralized in a binary fashion. The independent variables account for the environmental conditions and are all measured at the country-level.

I argue that the organizational structure is determined by the conditions in a terrorist groups primary country around the time of formation and that it is unlikely to change. The primary country of a terrorist group is the country in which it perpetrated most of its attacks (Young and Dugan, 2014, p. 8).[13] The data are cross-sectional. This choice is theoretically and empirically justified as the organizational structure of a terrorist organization is very stable across time.[14] I created an original dataset which includes the information for 144 terrorist groups operating worldwide along with country-level predictors covering the time period from 1981 through 2010.

For this dataset I aggregate attack level information to group level information. I use data from the RAND Database of Worldwide Terrorism Incidents (RDWTI). It defines terrorism by the nature of the act rather than by the identity of the perpetrators or the nature of the cause. For an incident to be recorded in the database, it needs to be violent or threatening the use of violence. It is directed against civilian targets, meant to create fear within a society to coerce the opponent into certain actions. The motivation of an incident needs to be political.

I base the study on some conditions that restrict the empirical and theoretical scope of the analysis. First, I ensure that the data contains only a single observation for each unique group. This means that I exclude potentially duplicate observations that share different monikers, but are functionally the same organization.[15] Second, I only include terrorist groups which are operational for at least two years and have had five or more terrorist attacks. This is done to ensure some degree of operational heterogeneity within my sample, as it is possible that groups which do not meet those criteria would not have the same data generation process. The excluded groups are often one-off attacks, lone wolfs, or ambiguous cases of terrorist behavior. Finally, I exclude clearly non-violent political parties, social movements/mobs, criminal gangs, and instances of transformation from a terrorist group to purely criminal enterprises by case selection, since I investigate only terrorist groups which contintue to uphold their political focus.[16]

[13] Based on this coding, terrorist groups could, in principle, change their primary country over time. However, empirically this is not the case. Exploration of the data reveils that of the groups in my sample, only two terrorist groups conducted a substantial amount of attacks outside the country that is coded as primary country. The Cinchoneros Popular Liberation Movement is located in the primary country of Honduras (3 attacks). However, it conducted one attack respectively in Belize, Costa Rica, and Nicaragua. Hezbollah conducted attacks in a total of 24 countries. In its primary country Lebanon, Hezbollah conducted 84 attacks. Even though Hezbollah conducts attacks all over the world, their core organization remains in Lebanon.

[14] Terrorist groups do not change their organizational structure radically from centralized to decentralized, or vice versa. Some empirical cases have been found that made only moderate adjustments to their prevalent structure to accommodate environmental changes (i.e., Eccarius-Kelly, 2012; Jackson et al., 2005).

[15] I combine the observations, for example, for al Jehad and al Jihad, as well as for Al-Mansoorian and Lashkar-e-Taiba, for they are functionally the same organization.

[16] The same scope conditions hold for the analysis in chapter 5.

4.5.2 Dependent variable: Organizational structure - centralization

I operationalize the structure of terrorist groups in a binary manner coded 1 for centralized groups and 0 for decentralized groups.[17] To my knowledge, one of the most extensive efforts in measuring the structural characteristics of terrorists groups were undertaken by Joshua Kilberg (2012), who developed systematic rules for coding the organizational structure of terrorist organizations. I utilize his coding framework to ensure comparability and external reliability.[18] Kilberg classifies the organization of a terrorist group along three structural properties - leadership type, command and control, and functional differentiation. As such, the conceptual dimensions of organizational structure are used for the operationalization to make it quantifiable across cases. I utilize his coding procedures to create an original variable. Table 4.1 summarizes the coding framework applied for creating a binary measurement.[19] In chapter 3, I discussed leadership, functional differentiation and centralized command and control as criteria to classify the organizational structure of terrorist groups. Terrorist groups which have centralized command and control are directed by a central leaderhip entity translating into a centralized organizational structure. Terrorist groups may lack centralized command and control, but are functionally differentiated. Those functions need to be organized by a centralized leadership entity in order to be usable, thus, translating into a centralized organization.[20] If there is no functional differentiation and no centralized command and control, a terrorist group is classified as decentralized. In decentralized groups, leaders most often provide only ideological guidance. Those groups can be completely leaderless and self-organizing or they can have a leadership.

Table 4.1: Coding organizational structure of terrorist groups

Leadership	Functional differentiation	Centralized command & control	Coding
-	-	-	Decentralized
+	-	-	Decentralized
+	+	-	Centralized
+	-	+	Centralized
+	+	+	Centralized

For a group to be coded as having an identifiable leadership, evidence has to clearly indicate the existence of a governing entity. This could be the existence of an individual person with the authority

[17] The same coding applies to the analysis in chapter 6.

[18] I trained myself recoding randomly selected cases from Kilbergs data. Thus, I ensure consistency in the coding process.

[19] Please see appendix A.1 for an overview of all terrorist groups and their organizational structure in their first year.

[20] Oftentimes, it is empirically difficult to observe functional differentiation and centralized command and control due to the clandestine character of terrorist groups. If there is functional differentiation, it is reasonable to assume that there is a structure in place that can integrate the various tasks in order to carry out attacks. However, this is rarely observable.

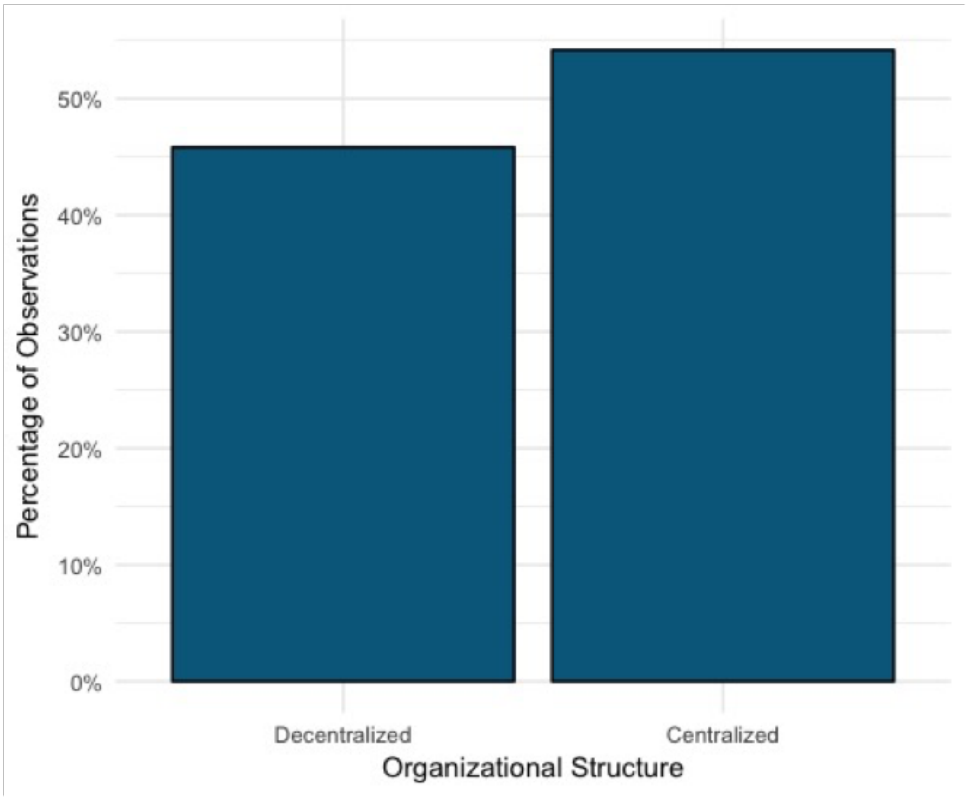

Figure 4.1: Distribution of organizational structure

to set the strategic and tactical agenda, but also includes a leadership council that shares this privilege and obligation. For a group to be coded as having functional differentiation, it needs to have at least one clearly distinct department or cell that is dedicated to a specialized function. This could entail a political wing, a technical department such as a bomb-making cell, or a department that is handling communication and marketing. Kilberg (2012) also accounts for structures of centralized command and control. For a group to be positive on this dimension, evidence clearly needs to indicate the presence of vertical hierarchy. Evidence has to clearly point towards leadership, functional differentiation, or a centralized command and control structure to be coded as present. Otherwise it is coded as missing. I utilize this procedure to hand-code all the terrorist groups in my sample. Extensive research allowed me to find information on the organizational structure for 176 groups out of 205, identifying them as either centralized or decentralized. Figure 4.1 shows the distribution of organizational structure in the sample, showing 78 (54.2 %) groups to be centralized and 66 (45.8 %) decentralized.

4.5.3 Independent variables

In order to code environmental variables that capture the situational context in which a terrorist group operates, a base of operations needs to be identified. Each terrorist group is assigned a country. I utilize

data from Young and Dugan (2014), who define the primary country of a terrorist group as the country in which it perpetrates most of the attack over its entire lifespan. This allows me to attribute characteristics of the country as covariates affecting a terrorist group's behavior.

To assess the *repression* a terrorist group faces in a country, I use state capacity to assess the general ability to repress and additional indicators for more specific repressive activities to assess the willingness to repress. Doing so, I aim to come as close as possible to measure what actions a terrorist group actually faces. In many studies state capacity is measured by GDP per capita (Fearon and Laitin, 2003). GDP per capita is considered to be a valid proxy for state capacity as it captures the overall military, administrative, and bureaucratic capacity of a state (Fearon and Laitin, 2003; Hendrix, 2010).

However, this does not automatically translate into the ability and the will to fight terrorist actors in a country. I measure state capacity with the logged military expenditure per soldier as an indicator for the quality of the military (Powell, 2012; Reiter and Stam, 1998). I further use the CIRI human rights data to include a more fine-grained measure of repressive activities (Cingranelli, Richards and Clay, 2014). The data measure torture, political imprisonment, disappearances, and killings, respectively. Cingranelli, Richards and Clay (2014) provide an additive index constructed from those four variables, ranging from 0 to 8, where zero indicates that the government has no respect for the human rights preventing them from such activities, and eight indicating that the government has full respect for those rights. This coding implies that lower values correspond to more repressive activities. Correspondingly, a positive correlation with the likelihood for terrorist groups to adopt a centralized structure indicates support for hypothesis two.

Next, I count the number of terrorist groups that are active in a group's foundation year to measure the *potential for interaction* with those groups. A terrorist group is counted if it is recorded to have committed an attack in the same year. This measure deviates from the one Young and Dugan (2014) used to measure terrorist groups in a country. They count all groups that may or may not have committed an attack in the same country and year. However, accounting only for those groups that actually commit attacks matches better my theoretical requirements as the mechanisms of competition and cooperation rely on the signaling of a certain capability. Attacks are such a signal.

Ethnic fractionalization measures "the probability that two people randomly chosen from society will be from different ethnic groups" (Alesina et al., 2003, p. 158f.). The higher the value of the variable is, the higher is the ethnic fractionalization in a country. I use the data on ethnic fractionalization collected and used by Alesina et al. (2003).

I consider alternative explanations of terrorist groups' organizational structure. I include a dummy for *maximalist ideology* relying on original coding based on openly accessible documents. The ideology

of a terrorist group is publically communicated as part of propaganda and, thus, is relatively easy to identify.[21] I differentiate those terrorist groups that have a maximalist ideology from those that have local or concretely defined goals. A terrorist group is coded to have a maximalist ideology if it is motivated by religious, rightist or leftist goals. It is coded zero if the terrorist group is motivated by nationalistic or separatist goals.[22] Further, I include a dummy for *Cold War* that takes the value 1 if the organisation was founded in the years 1970 through 1989, and 0 otherwise. Finally, I include some control variables. Region dummies are created from the GTD. I code five regions Asia, America, Europe, Sub-Saharan Africa, and one combining countries from the Middle East, Central Asia, and North Africa. The reference category is Asia. Using data from the Uppsala Conflict Data Program I code a dichotomous variable that is 1 if there is a militarized conflict in a terrorist groups primary country, and 0 otherwise (Allansson, Melander and Themnér, 2017; Gleditsch et al., 2002).[23]

4.5.4 Handling missing data problems

Given the nature of the countries in which terrorist groups operate, the collection of reliable data is sometimes complicated. The absence of state institutions collecting data, political revolutions, or foreign occupations render statistics on the government and society of some states impossible to collect systematically. This leads to a substantial amount of non-random missing values biasing the results. Therefore, I manually code missing values by making a case-by-case decision. Military expenditure per soldier is an important measure of state capacity, but military expenditure and military personnel was lacking for Iraq in 2004 and 2007, Afghanistan 1988, 1995, and 2004, Somalia 1992, 2007, and 2008, and for East Timor in 1999. I use data from the Stockholm International Peace Research Institute (SIPRI) on military expenditure and personnel (SIPRI, 2016). This allows me to calculate the missing values for Iraq and Afghanistan in 2004, respectively. I use information on the material military capacities of Indonesia to code East Timor in 1999, as the terrorist groups in this country were fighting Indonesian occupation. The rest of the missing data could not be imputed.

As I aim to explain the effect of environmental conditions on the organizational structure of terrorist groups in the year of formation it is reasonable to assume that the conditions in a country in the year before are also relevant. The inertia of the formation process may require lagging time-variant variables.

[21] Most coding was done using South Asia Terrorism Portal (http://www.satp.org/), Mapping Militant Organizations (http://web.stanford.edu/group/mappingmilitants/cgi-bin/), the Big Allied and Dangerous Database (BAAD) (http://www.start.umd.edu/baad/database), and Libicki and Jones (2008).

[22] Some terrorist groups combine more than one ideological profile. To code those ideology dummies, the most prominent ideology was chosen. I.e., the Mahdi Army in Iraq has a Shiite profile, but it was formed to fight against the U.S. Army in the Second Gulf War. Thus, it is coded as nationalistic/separatist.

[23] Please see chapter 5 for an explanation concerning the relevance of controlling for the existence of a militarized conflict in a country.

I have done this for the military expenditure per soldier. However, adding lagged variables drastically decreases the amount of observations, since variables, which stem from the data sources mentioned above, are often not reported in the year previous to the one of the observation. This can increase missing values and lead to a corresponding bias. This bias, for example, is problematic concerning the repression variables, since earlier experiences can be expected to have an effect on a terrorist group organizing itself. Where the military is well equipped to fight terrorist groups in a country, a terrorist group may expect little safe operational space, which it may accommodate with its organizational structure right from the foundation. If a terrorist group expects repressive actions such as torture and targeted killings, it may include build-in functional and structural redundancies in its organization or isolate persons, who are critical to its survival. Therefore, I refrain from lagging variables where necessary, being aware of the bias it might introduce to the results. The exploration of ethnic fractionalization has shown no variation within the countries in my sample. Thus, lagging ethnic fractionalization makes little empirical sense. Conflict and Cold War are not lagged either. Rather than following empirical deliberations. the rationale is a theoretical one. The overall argument is that the environment provides opportunities and restrictions for terrorist groups to form. It is assumed that those two variables impact a terrorist group's opportunities right away.[24] The overall precision of the results, thus, does not benefit from lagging variables.[25] Table 4.2 provides the descriptive statistics of the included variables.

4.5.5 Method

I investigate the correlation between environmental variables and the organizational structure of terrorist groups. I fit logistic regression models as I regress on a dichotomous dependent variable. I calculate the predicted probabilities of significant predictors to assess the substantive effect of each variable.

4.6 Results

Overall, the environmental variables investigated in this study explain a considerable amount of the residual variation in the question if a terrorist group adopts a centralized or decentralized structure. Table 6.2 shows the results. The first model shows the regression coefficients when including only the control variables. The second model includes all independent variables. The results support hypotheses 1 and 2 relating a government's ability and willingness to repress a terrorist group to the likelihood of

[24] If anything, it might be interesting to evaluate the effect of those conditions changing in the year of foundation in future iterations of this research topic. Depending on the degree and direction of change this immediately affects a terrorist group's opportunities and restrictions.

[25] The number of other terrorist groups in the same country in the foundation year could also not be lagged due to peculiarities of the data generation process.

Table 4.2: Descriptive statistics

Number of terrorist groups in sample			144	
Numerical variables				
Variable	**Mean**	**Variance (SD)**	**Max**	**Min**
Interaction	1.62	1.67	7	1
Military Capacity	9.20	1.16	12.07	4.89
Ethnic Fractionalization	0.49	0.32	0.90	0
Repression	1.98	2.05	7	0
Factor Variables				
Variable		**Yes (1)**	**No (0)**	**In percent**
Centralized Structure		78	66	54.2%
Conflict		111	31	78.2%
Cold War		27	117	18.8%
Maximalist		96	48	66.7%
Asia		51	93	35.4%
Africa		23	121	16.0%
America		13	131	11.1%
Europe		10	134	7.9%
MeCaNa		47	97	32.6%

it adopting a centralized organiztional structure. Both coefficients are statistically significant and point into the expected direction. My results do not support hypothesis 3 that more terrorist groups in the same country in the year of formation positively affect the likelihood of having a centralized structure. The coefficient for interaction is not statistically significant. Hypothesis 4 is also supported: Higher levels of ethnic fractionalization correlate with a higher likelihood of a terrorist group being centralized. Hypothesis 5 and 6 are supported. The statistically significant coefficients for Cold War and maximalist ideology point into the expected direction.

To further shed light on these effects, I calculate the predicted probabilities for the statistically substantive predictors. Figure 4.2 shows the effects. This allows me to evaluate the substantive effect of each variable at different values. The substantive effect of a variable is assessed by how much the probability changes that a terrorist group has a centralized organizational structure. The plots show how the probability of terrorist groups adopting a centralized structure changes when shifting the respective predictor from the minimum to the maximum. My findings confirm previous case-specific work suggesting that higher state capacity relates to a lower likelihood of being centralized. The effect of military expenditure per soldier is highly statistically significant indicating a negative correlation with the likelihood of a terrorist group adopting a centralized structure. Substantively, the predicted probability of having a centralized organizational structure decreases massively from about 99.5% for the lowest level of state capacity to 0.03% for the highest level of state capacity as shown in figure 4.3.

Figure 4.4 shows the predicted probabilities of a terrorist group adopting a centralized structure

Table 4.3: Regression results

	Dependent variable:	
	Centralized structure	
	(1)	(2)
Military Capacity		-1.211^{***}
		(0.327)
Repression		0.463^{**}
		(0.199)
Interaction		0.238
		(0.182)
Ethnic Fractionalization		2.810^{*}
		(1.472)
Maximalist Ideology		-0.891^{*}
		(0.524)
Conflict	-0.031	0.899
	(0.498)	(0.683)
Cold War	1.924^{***}	1.937^{**}
	(0.631)	(0.870)
MeCaNa	-0.331	1.562
	(0.436)	(1.017)
America	-1.890^{**}	0.238
	(0.820)	(1.340)
Europe	-3.038^{***}	-1.778
	(1.168)	(1.647)
Africa	-1.258^{**}	-2.223^{***}
	(0.555)	(0.832)
Constant	5.124^{**}	8.162^{*}
	(2.487)	(4.635)
Observations	142	122
Log Likelihood	-84.877	-59.533
Akaike Inf. Crit.	183.753	143.066
Note:	*p<0.1; **p<0.05; ***p<0.01	

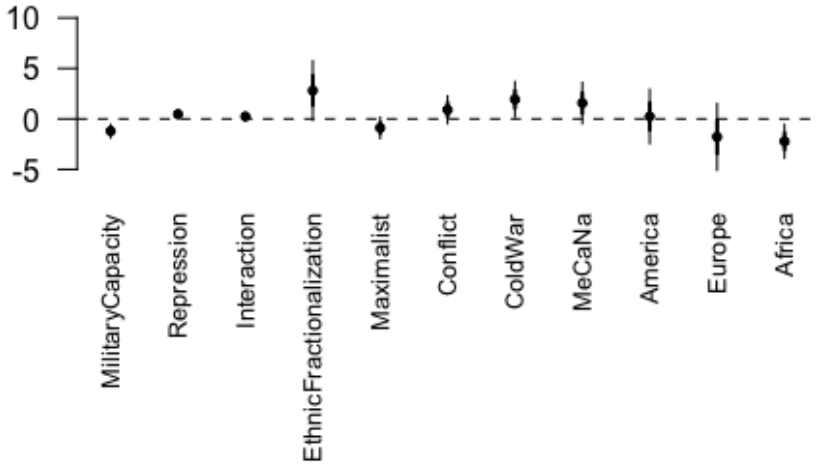

Figure 4.2: Regression estimates

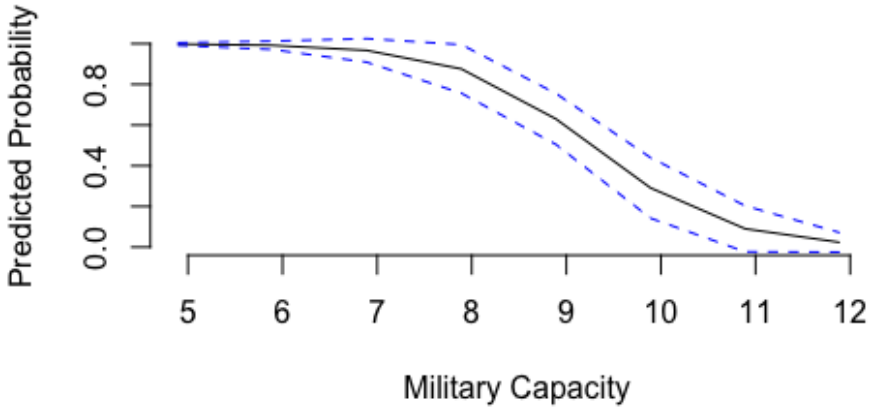

Figure 4.3: Effect of state capacity on having a centralized structure

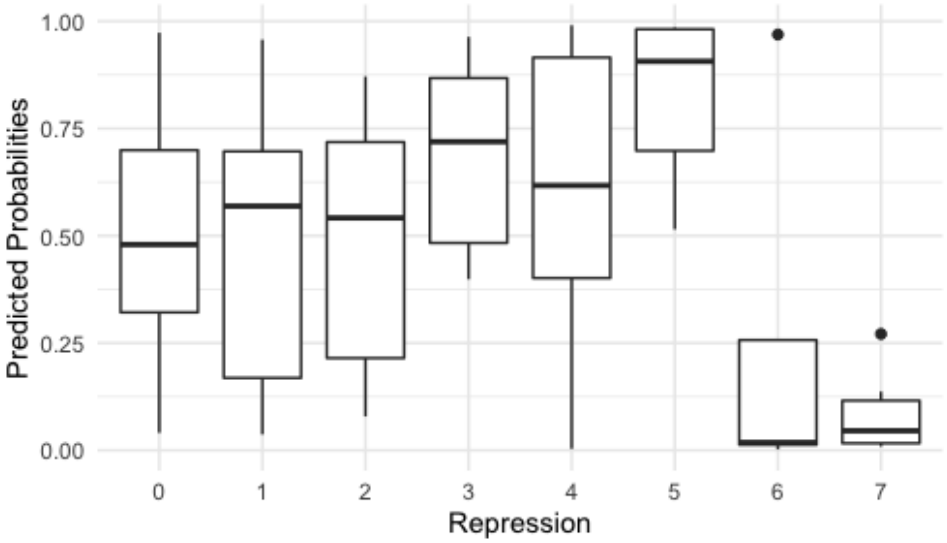

Figure 4.4: Effect of repression on having a centralized structure

for the varying values of repression. The value 0 indicates a high willingness to repress while this willingness decreases in the sense that the value 7 indicates low willingness to repress. The coding of the variable indicates that higher values of the repression predictor are expected to correlate with a higher probability of a terrorist group being centrally structured. The substantive effect shows that behind the overall support of hypothesis 2 rests a heterogenous effect. The highest two values of the repression correlate with a lower predicted probability of a terrorist group adopting a centralized structure. For the values 0 through 5, the expected effect is substantiated with a slight deviation for the value 4. This suggests an ambiguous effect for medium levels of repression.

I also find support for hypothesis 4, which states that higher levels of ethnic fractionalization correspond to a higher likelihood of terrorist groups adopting a centralized organizational structure. The predicted probability increases by 55.8 percentage points from 21.9% for terrorist groups in countries with minimum ethnic fractionalizatio,n to 77.7% for terrorist groups in countries with the maximum ethnic fractionalization. Figure 4.5 illustrates this effect.

Lastly, I also find support for the hypothesized effect of a maximalist ideology. Having such an ideological profile decreases the likelihood of a terrorist group having a centralized organizational structure. Figure 4.6 shows that the predicted probability increases by about 21.6 percentage points, from 66.2% for terrorist groups that have a nationalist/separatist ideology to 44.6% for those pursuing maximalist goals.

My results further support the finding that during the Cold War, terrorist organizations were more likely to be centralized as illustrated in figure 4.7. The predicted probability increases by roughly 41

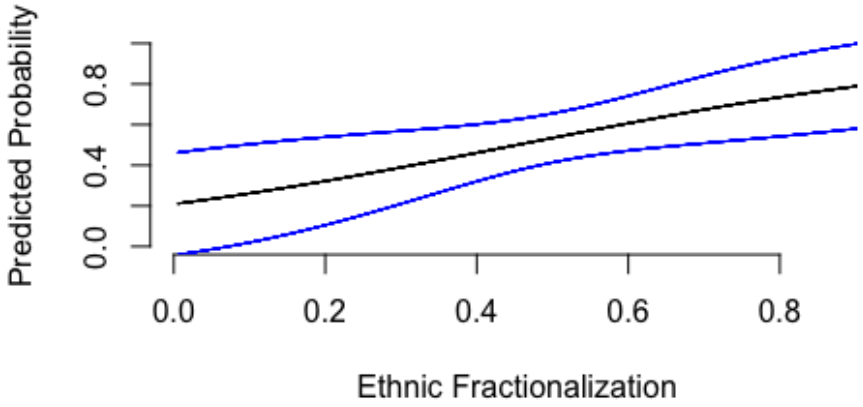

Figure 4.5: Effect of ethnic fractionalization on having a centralized structure

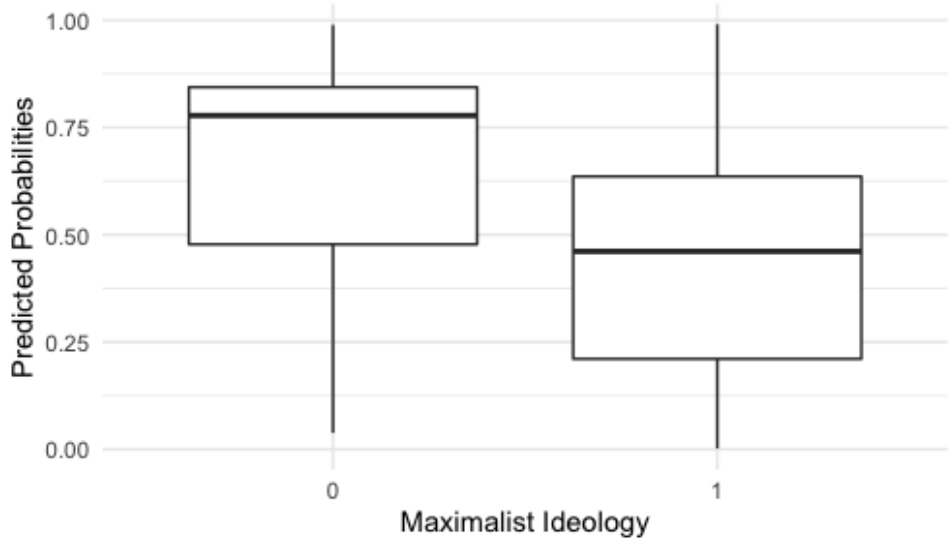

Figure 4.6: Effect of maximalist ideology on having a centralized structure

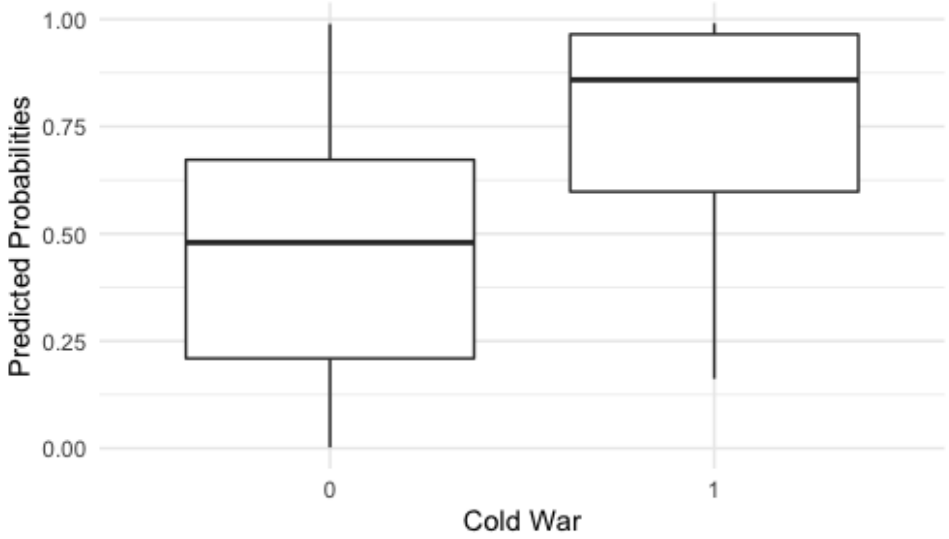

Figure 4.7: Effect of Cold War on having a centralized structure

percentage points from about 43% for terrorist groups that were founded after 1989, to 83.9% for those that originated during the Cold War. This finding confirms the previous literature, which attributes terrorist groups a professionalized organization resulting from the need to work with supporting state actors.

The variables tested in this analysis capture three theoretical mechanisms of how the environment can shape the organizational structure that a terrorist group adopts. If a terrorist group is likely to be repressed and met by their opponent with counter-terrorist activities, it is more likely to adopt a decentralized structure. While previous research focuses on state capacity alone, I test for the willingness of a state to fight terrorists with repressive means. I find that terrorist groups located in states which have little regard for human rights and include torture, political imprisonment, disappearances, and extrajudicial killings in their counter-terrorism repertoire, are less likely to adopt a centralized structure. Those findings are intuitive and in line with prior findings that attribute the decentralization of terrorist groups to state capacity (Helfstein and Wright, 2011; Raab and Milward, 2003). Terrorist groups need to maintain their organizational security to survive and sustain their capability to carry out operations. Using this measure of repression alongside the military capacity of the state alone allows me to obtain more fine-grained results. In sum, my analysis disaggregates the repressive capacity and the willingness of a state to make use of that repressive capacity.

The second theoretical mechanism describes the opportunities for mobilizing resources. Terrorist groups have various options to engage with their environment to extract resources. For example, they can cooperate with other terrorist groups, or they can rely on support from within the population. I hypo-

thesize that the number of other terrorist groups in the country and the degree of ethnic fractionalization are indicators of the resourcing opportunities terrorist groups have. All resource generation methods come with requirements on the organizational structure. I theorized that those opportunities correlate with a higher likelihood of a terrorist group having a centralized organizational structure. The empirical results support the effect of ethnic fractionalization. However, I find no support for the interaction with other terrorist groups in a country. I also find support for the argument that terrorist groups founded during the Cold War are more likely to be centralized to fulfill the requirements bestowed on them by their state supporters. This supports findings by Jodi Vittori (2011), who includes this type of relationship in her resourcing model highlighting the dependence of terrorist groups on their resources.

Beside those environmental variables, I account for an alternative group-internal variable. I find support for the effect of a maximalist ideology. This points toward the importance of considering a terrorist group's goals and what implications this has for its internal structure. The more tangible a terrorist group's goals are, the more important it is to adopt a consistent strategy. Central control is beneficial for maintaining control over tactical and strategic behavior of the members allowing a terrorist group to pursue their strategy consistently.

4.7 Conclusion

In this chapter I analyzed why some terrorist groups are centrally organized, while others adopt a decentralized structure. Given the advantages of a centralized organization, previous work argues that terrorist groups choose a decentralized structure as it makes them more resilient when being challenged by repressive activities of the state (Eilstrup-Sangiovanni and Jones, 2008; Podolny and Page, 1998). Others claim that the requirements of an organization have changed with the development of new technologies (Crenshaw, 2008; Jenkins, 2006).

To the best of my knowledge, the explanatory factors of a terrorist group's organizational design have never been systematically tested in a large-n quantitative design. Ample empirical evidence based on individual or comparative case studies suggests that the environment of a terrorist group affects its organizational structure (Eccarius-Kelly, 2012; Johnston et al., 2016). These studies suggest that terrorist groups strategically exploit their environment to improve their performance. They can exploit those conditions by matching their organizational structure to the opportunities and challenges given by its environment. Linking this analysis to the overall theoretical argument of the dissertation, terrorist groups are viewed as economic entities that maximize their managerial efficiency given a certain kind of environment. Adopting an organizational structure that capitalizes on the opportunities while minimizing

the risks is one way to account for one's environmental conditions. The central argument is that terrorist groups need a business strategy that integrates and manipulates the resources over which it has control (Reed and DeFillippi, 1990). Having an organizational structure that matches the resource opportunities of the environment introduces variation in between such business strategies. This allows terrorist groups to perform at a higher level than terrorist groups in the same industry or market gained through different group attributes and resources. My analysis shows that terrorist groups match their organizational structure to the opportunities and constraints within their environment. With this theoretical and empirical approach, I complemented the available case-study evidence by systematically defining the mechanisms that are often lacking or only are implicitly asserted from previous work. Future work needs to proceed on verifying those mechanisms and explore possible explanations.

One reason why I analyzed on environmental variables is to focus on those variables that can be observed. Environmental conditions cannot fully explain why some terrorist groups adopt a centralized organizational structure, while others opt for a decentralized design. My conceptual and empirical models were not meant to fully explain the residual deviation. External conditions only provide half of the explanation, as internal dynamics play an important role. I tested one group-internal variable as a first attempt to account for those factors. The ideology of a terrorist group is public information. It serves propagandistic purposes and is therefore communicated by the terrorist group to all its audiences. It allows for a categorization of terrorist groups based on its stated political goals. Future research needs to hone in to those internal factors. It also needs to account for possible interactions between the environment and group-internal variables. As the initial quote by Sadler and Barry states, it might be important to focus on group-internal dynamics, but those dynamics are, in turn, a function of the environment themselves.

Qualitative case-based research can identify new and specify existing mechanisms. Other group-specific factors can be important that are not part of this study. The type of leadership may affect the degree to which internal control is required. For example, a charismatic leader may benefit from a devout following which obeys his command without structural control mechanisms in place. Similarly, groups that rely on close inter-personal relationships have different structural requirements than groups which have a more formalized membership. I advise future exploration of determinants of terrorist groups' organizational structures to explore those group-internal mechanisms. Qualitative case studies and case comparisons can help identifying other mechanisms.

There are also more environmental factors that may play a role. Terrorist groups have plenty of resourcing opportunities. Some examples include the exploitation of natural resources or the trade of various kinds of contraband. IS, for example, generated a great amount of resources selling oil, but also

engaged actively in the trafficking of antiquities, drugs, and other forms of booty (Callimachi, 2015; Callimachi and Tondo, 2016). The variables tested in this study are proxies for the three mechanisms. Future work can develop the research into this direction. This would allow researchers to compare more than only a few terrorist groups at a time and help develop a more fine-grained theoretical approach.

To that end, better data need to be generated. The clandestine character of terrorist groups and their day-to-day operations severely restrict the availability of cross-sectional or even longitudinal data. Research on this topic would benefit greatly from the systematic collection and exploitation of country-level data. My analysis showed that a substantive part of the residual variation can be explained by those country-level factors.

The analysis in this chapter shows that which organizational structure a terrorist group adopts is a function of both external and internal factors. The goal of this dissertation is to study the interplay of internal and external factors to better understand the behavior of terrorist groups. In the next chapter, I continue to analyze this interplay by studying how various external and internal predictors affect the likelihood of a terrorist group to get involved in organized crime.

Chapter 5

Exploring the determinants of terrorist involvement in organized crime[1]

5.1 Introduction

Terrorist groups that become involved in organized crime pose salient security challenges across the world. Faced with the need to fund their operations, some terrorist groups engage in criminal activities, or they turn to criminal groups to supplement their resources with illegal activities such as the trade in drugs or weapons (Freeman, 2011; Geltzer, 2011; Giraldo and Trinkunas, 2007). Without monetary resources, terrorist organizations are restricted in their ability to inflict harm. While financial support for operations originates from many sources, such as domestic and international sponsors, natural resources, or looting, the involvement in organized crime is among the most lucrative (Costigan and Gold, 2007; Wang, 2010).

By increasing their financial revenues, terrorist groups can expand their tactical repertoire. Organized crime opens up opportunities that would not be available otherwise. First, crime can be used to generate funds that support their military operations and their political activities.[2] Second, crime can be used to provide logistical support, such as enabling the clandestine movement of personnel, material resources, and money. Also, criminal activities can help prepare for operations through the procurement and transportation of weapons and personnel on the black market by engaging in illicit human smuggling (Williams, 2014). Moreover, terrorist groups use criminal activities as a means to generate a resource pool which is independent from direct operational support. For example, terrorist groups can

[1] This chapter is based on a paper co-authored with Clayton Besaw, published in the Journal of Quantitative Criminology (2019).

[2] Some terrorist groups have a broader functional repertoire. Hezbollah, for example, has a political wing and provides social services to their supporters (Berman and Laitin, 2008).

bribe officials to sign off paperwork for transporting weapons from one country to another.[3] Terrorist organizations justify the use of criminal activities as either a means to an end, or as directed against the enemy in the name of the larger cause affecting the economic and political stability of a country (Williams, 2014).

While organized crime may provide relatively high returns on the terrorist group's investment, it raises the group's visibility to law enforcement units. A shift towards profit generation may additionally endanger a group's ideological clout. Given this puzzling behavior, the question investigated in this chapter is: *Why do some terrorist groups engage in organized crime while others do not?*

Terrorist groups' engagement in organized crime can be understood as a function of opportunity and need. Previous research proposes several theoretical models suggesting a variety of factors that make the connection between organized crime and terrorism more likely (Asal, Milward and Schoon, 2015; Forest, 2013; Makarenko, 2004*b*; Shelley and Picarelli, 2005; Williams, 2002). Those studies identify weak state structures, corruption, or militarized conflicts as environmental contexts that provide opportunities to turn to crime (Shelley, 2014). Looking inward, organizational attributes may also affect the likelihood of a terrorist group being engaged in organized crime. The size of the organization, network structure, territorial control, or ideology can incentivize criminal behavior (Asal, Milward and Schoon, 2015; Shelley and Picarelli, 2005). Both environmental and organizational factors affect the opportunities terrorist groups experience for engaging in organized crime and to generate the necessary revenue. Organizational and environmental factors do this by either opening opportunities for engagement, or by pushing groups towards it. For example, a terrorist group that operates in a country with weak governmental control can more easily engage with criminal actors operating in the same environment.[4] Similarly, larger terrorist groups are more likely to possess criminal skills and the know-how to engage with organized crime.

The aim of this study is to identify factors that improve our capacity to predict if a terrorist group is involved with organized crime. To do this, I utilize an inductive machine learning approach using a random forest classifier. The random forest method utilizes an ensemble of individual decision trees to produce out of sample predictions of whether a group has engaged in organized crime. Such an approach deviates from more deductively driven classification analyses commonly used in the study of terrorist behavior, namely the logistic regression model.[5] The random forest is not beholden to the assumptions

[3]To sell arms internationally an end-user certificate is required. It certifies that the buyer is in fact the final recipient of the arms. It is meant to ensure that arms and ammunition are not sold to an unnamed third party or embargoed states. Forging or altering end-user certificates allows shipments of arms to be transported via official channels and routes.

[4]As discussed later in the chapter, weak states support the development of criminal actors as well as terrorism. Their interaction is more likely due to their co-existence (Freeman, 2011).

[5]I include the results of a logistic regression Appendix A.1 for comparison by the reader.

that underlie regression parameter estimation and does not assume a specific functional relationship between predictors and outcomes.[6]

While the random forest contains many advantages for out-of-sample prediction, it has received criticism. Algorithms like the random forest have been described as a "black box", in that it is difficult for the analyst to unpack the causal relationships between predictors and outcomes. Because I am interested in out-of-sample accuracy, I do not address problems of causal inference (e.g., endogeneity, simultaneous reaction, etc.). Using cross-validation allows us to estimate the out-of-sample accuracy of my prediction model and to explore substantive relationships outside regression assumptions. The goal is to provide rigorous preliminary evidence for further theory building and deductive hypothesis testing. To address different features of the forecast, I examine three aspects of the random forest. First, I explore the out of sample predictive efficacy of several predictors of engagement in crime by using k-fold cross-validation and area under the curve (AUC) scores. Second, I utilize a measure of variable importance to assess which individual predictors are most important in gaining predictive accuracy. Finally, I create partial-dependence functions for the eight most important predictors, to visualize the functional relationship between predictor and outcome while controlling for all included predictors.

Following this machine learning methodology, I obtain four results. First, the inclusion of both organizational and environmental predictors has good, but not perfect, predictive accuracy when classifying criminal engagement by terrorist organizations. Second, organizational factors are better at predicting relative to environmental factors. Third, I find that group size and ideology are the most influential variables for leveraging accurate predictions. Finally, I find that the eight most important predictors have non-linear relationships with outcomes in engagement with organized crime.

5.2 Terrorism and organized crime

The definition of terrorism is contentious. We define terrorism as a tactic that is used by violent non-state organizations to achieve political goals. As such, I can include all organizations that have been observed to employ terrorism. It allows us to include violent non-state organizations irrespective of them being commonly labeled terrorists or rebels.[7]

The definition of organized crime includes the trafficking in drugs, arms or humans, as well as money laundering through legal enterprises. The UN Convention against Transnational Organized Crime (UNODC) defines an organized criminal group as 1) a group of three or more persons that was not

[6]Within the quantitative study of terrorism, logistic regression remains the workhorse methodology for analyzing binary dependent variables. We argue that the random forest method is likely to be better for the analysis of complex problems due to its ensemble methodology and the absence of strict functional form assumptions.

[7]See chapter 2 for a detailed definition of terrorism.

randomly formed, 2) existing for a period of time, 3) acting in concert with the aim of committing at least one crime punishable by at least four years incarceration 4) in order to obtain, directly or indirectly, a financial or other material benefit (UNODC, 2004, p. 5). The UN Office on Drugs and Crime (UNODA) identifies organized crime as a severe threat to peace and individual security as it violates human rights and undermines the economic development and political stability in a country (UNODA, 2017).[8] We use this definition accordingly.

5.2.1 Comparison of terrorist groups and organized crime

Alex Schmid (1996) notes several commonalities between terrorist groups and organized crime groups. Both are strategic actors which pursue preferences through violence. Their tactics are similar, as both actors use strategies such as kidnappings or assassinations. They both oppose governmental authority, leading to their illicit and clandestine nature (Schmid, 1996). Therefore, they need to employ strategies which allow them to avoid detection, while mitigating the risk posed by the governments' law enforcement agencies and peer competitors.

However, several factors differentiate the two phenomena. James Forest (2013) argues that terrorist groups and organized crime groups follow a different purpose when employing violence. Criminals aim to secure their business operations, leading them to focus their violence on protecting their membership and supply chain. Conversely, terrorist groups often do not use much discretion when it comes to the selection of victims. Terror victims often have symbolic meaning, used as a message to instill fear in a broader population.

The motivation for actors to use organized crime or terrorism also differs. Williams (2007) notes that terrorist groups have subjective political goals, whereas organized crime pursues a greater share of their respective illicit markets. Actors also use different communication strategies. While criminals prefer to stay away from the spotlight, terrorists seek a certain degree of media attention, claiming responsibility for their actions to propagate their cause (Forest, 2013).

Napoleoni (2004) suggests that terrorists and criminals can be distinguished by their view of money. She points out that the ultimate goal of organized crime organizations is to accumulate as much wealth as they can, whereas terrorist groups seek funds to support their operations. However, just as criminals need to invest in suppliers and transit routes to ensure ongoing access to markets, terrorist groups need to ensure a constant inflow of funding to ensure strategic and logistic efficacy. Napoleoni (2004) calls

[8] There are two different types of organized crime. Those which provide goods and those that provide protection. Often, the same actor provides both types of criminal activity. The Italian Mafia, for example, is providing a range of criminal activities which generate funds and deals contraband on the black market (Europol, 2013). Similarly, FARC in Columbia, engages in the production and distribution of drugs, but also provides protection to the local population against other violent actors in the area (Felbab-Brown, 2010).

this the "economy of terror."

5.2.2 Collaboration and appropriation

Terrorist groups can engage in organized crime themselves or they can collaborate with established actors of organized crime. Both strategies provide financial revenue and access to operational resources, but they entail different behaviors and costs. Given the differences, several scholars argue against true collaboration between criminals and terrorists (Dandurand and Chin, 2004; Hoffman, 2006; Préfontaine and Dandurand, 2004). Terrorist groups evolve into criminal enterprises as political motivations become secondary to economic gains (Makarenko, 2004*b*). Concerning the interaction between terrorism and organized crime, theoretical approaches span the continuum between no interactions on one end, to the production of internal criminality on the other.[9] Between those two extremes, one can observe varying degrees of collaboration, ranging from opportunistic one-off collaboration to long-term alliances or appropriation of organized crime (Naylor, 1993; Schmid, 1996; Williams, 2007).

The focus of my analysis lies on terrorist groups that either cooperate with organized crime or appropriate organized crime in the pursuit of their political objectives (Mincheva and Gurr, 2013, p. 2).

5.3 Terrorist groups' involvement in organized crime

We define a terrorist group's involvement in organized crime both as collaboration and appropriation. As elaborated above, terrorist groups and actors of organized crime have incentives not to collude with the other. Throughout history, terrorists have always been adamant not to be labeled as ordinary criminals. They consider themselves to be fighting for a bigger political cause that justifies their actions. As such, they use labels like freedom fighter, or holy warrior (Silke, 2008). Justifications for violence come through a broader ideology that rises above petty criminal interaction. However, involvement with organized crime increases a terrorist group's visibility and vulnerability to law enforcement initiatives. So, engaging in criminal activities increases a terrorist group's likelihood of detection.

Similarly, actors of organized crime have an incentive to stay away from terrorism. In a business where security from law enforcement is paramount, interaction/engagement with terrorism endangers the enterprise. Mark Galeotti (2009) summarizes this reluctance, stating that "on the whole organized crime groups have not shown any particular enthusiasm to work with terrorists, whom they regard as not only unreliable and amateurish but also dangerous, in that any evidence of such a connection is likely

[9] For conflict between criminal and terrorist organizations see Schelling (1984); for models of in-house production of crime see Cornell (2007), Dishman (2001), Makarenko (2004*b*), Schmid (1996).

to trigger a much more immediate and heavy-handed law enforcement response in the post-September 11th era."[10]

While differences in their objectives suggest the interaction between terrorist groups and organized crime to be unlikely, both anecdotal and empirical observations show that interaction between the two types of illicit organizations occurs at a non-trivial frequency (Asal, Milward and Schoon, 2015; Bovenkerk and Chakra, 2005; Perl, 2001; Piazza, 2012; Shelley and Picarelli, 2005). Two well-established examples of collaboration are FARC and the Afghan Taliban. Both organizations have an active and established political and social agenda, and both collaborate with international drug smuggling enterprises.[11] Those examples illustrate that terrorist groups engage with actors of organized crime even in instances where their ideological foundation potentially discourages criminality and profit. Both organizations appear to value the gains from interaction more than the costs that come with it.

Comparing the Kurdish PKK and FARC, Eccarius-Kelly (2012) finds that they collaborate with organized crime. They share critical infrastructure and knowledge concerning criminal skills, allowing the terrorist groups to advance their operational repertoire. Both groups benefit, as they need to fulfill the demand for a special skill or other assets, which are not available within their own organization (Eccarius-Kelly, 2012).

Williams (2002) finds that short-term operational collaborations are more common than established long-term alliances. This is due to a setting which is governed by anarchy, making prolonged formalized interaction difficult to sustain. In such a setting, short-term collaboration allows terrorist groups to extract resources from the criminal market with minimal investment and economic risk, and without the knowledge and experience of the specific market and supply chains.[12]

In sum, terrorist groups are likely to collaborate with organized crime due to reasons of expediency and mutual convenience (Williams, 2001). Terrorist groups use the connection to organized crime to gain access to their clandestine logistics network to exchange and exploit each other's resources. Thus, their choice of collaborating with organized crime depends on whether the offered goods match their needs (Williams, 2001, p. 135). On several occasions, terrorist groups have interacted with arms traffickers to buy the weapons needed for an attack. The Syrian arms trafficker Monzer al-Kassar has provided weapons to multiple terrorist groups, among which are Hezbollah, PFLP-General Command, or FARC

[10] Cited in Forest (2013, p. 175).

[11] These two examples especially highlight the puzzling nature of crime-terror cooperation. The Taliban have an explicit moral agenda that is embodied by Sharia law, yet aids the production and trade of narcotics that are considered forbidden in Islam. In Colombia, FARC seek to establish a socialist state that would conduct land and wealth reform to aid marginalized socio-economic groups (agriculture and urban labor), yet cooperate with extremely violent and destructive drug trafficking organizations which often inflict harm on the poorest of Colombian citizens.

[12] On the resource extraction in short-term collaborations see Saab and Taylor (2009) or Williams (2002). Of course, short-term collaboration can be a repeated event, thus resulting in long-term collaborations. The logic, however, is still operational, not motivational.

(Greenberg, 2010).

Terrorist groups can also engage in organized crime themselves. Williams (2001, p. 138) identifies three levels of this process. First, terrorist groups can take the strategic decision to turn to the in-house production of organized crime as a means to provide funding. Second, members of individual cells can sustain themselves through organized crime, and third, transnational diaspora networks, which are actively engaged in organized crime, can support the group. PIRA has gained substantial support by the Irish community in the U.S., who were strongly engaged in the trafficking of various kinds of contraband (Horgan and Taylor, 1999, 2003). In fact, the number of terrorist groups using criminal activities has increased over the last two decades (Williams, 2014, p. 6). A reason for this development may be that many criminal activities do not require a complex skill set and can be quickly internalized by terrorists. Furthermore, research has found an increasing trend of radicalization in criminal milieus and prisons (Rotella, 2004). This provides terrorist groups with a pool of members which possess sought-after criminal skills and personal networks, increasing their potential to appropriate criminal activities, but also to be able to collaborate with criminal actors via personal relationships.

Oftentimes, collaboration and the appropriation of organized crime occur together. The in-house production of organized crime might either precede or follow the collaboration with established criminal organizations. In the former case, terrorist groups that engage in the production of organized crime might get in contact with criminal groups, as they are an integral part of the illicit supply chain. In the latter case, terrorist groups first collaborate with criminals, for example through the purchase of weapons. To manage this interaction with the criminal market, terrorist groups need to embrace the logistics and functional requirements of crime. Over time, they may accumulate enough criminal know-how to become more actively involved in the criminal market, potentially becoming suppliers themselves. The difficulty to clearly distinguish collaboration from appropriation translates to both conceptual and empirical ambiguities in studies with explanatory research designs. We aim to mitigate this ambiguity by using a predictive research design, rendering the delineation between collaboration and appropriation empirically neglectable.

5.4 Predictors of terrorist group's engagement in organized crime

Because I seek to test predictive models of terrorist group engagement in organized crime, I first consult the literature concerning factors thought to be influential in shaping engagement. The aim here is to discuss potential risk factors as they might contribute to an accurate prediction of terrorist groups becoming involved in organized crime. As highlighted above, a terrorist group's involvement in organized crime

includes both costs and benefits. Previous research discusses the conditions that increase the likelihood of a terrorist group to become involved in organized crime. We assess to what magnitude each factor contributes to predicting a terrorist group's engagement in organized crime correctly. As such, I am less interested in testing theories of the substantive relationship between these predictors and engagement in organized crime. Instead, I seek to utilize inductive methods for evaluating their predictive efficacy and for determining relative predictive importance. As stated before, I also unlock the "black box" of the random forest algorithm by estimating the functional relationship between classification outcomes and each predictor.

The decision of a terrorist group to engage in organized crime draws on opportunism, pragmatism, and trust. While decisions of opportunism and pragmatism have been discussed above, trust is established via personal bonds or shared experiences. Individual relationships facilitate forming relationships. Those bonds are built on a foundation of ethnic or religious heuristics. Mutual backgrounds of coming from the same community or having faced imprisonment or oppression helps to establish trust relationships (Forest, 2012, p. 175). We focus on organizational and environmental characteristics that affect the likelihood of engagement in organized crime. We use these categories as they reflect two broad trends of approach found in the extant literature. They also reflect the theme of this dissertation to assess how external and internal factors affect the behavior of terrorist groups. Factors that fall within these two categories are explored in the following, as they affect the need of terrorist groups to engage in organized crime as well as the opportunities of terrorist groups to do so. We proceed to discuss both 1) organizational factors and 2) environmental factors as a theoretical foundation for my prediction analysis.

5.4.1 Organization-level characteristics

Asal and his colleagues (Asal, Milward and Schoon, 2015, p. 4) postulate greater *organizational size* to be correlated with a higher likelihood to be engaged in organized crime. They argue that large organizations need resources that exceed what the members of the terrorist groups can acquire, rendering organized crime a necessity. Furthermore, the size of a terrorist organization is often used as a proxy measure for human capital within the group (Asal and Rethemeyer, 2008). We expect larger terrorist groups to be more likely to possess the ability to engage in organized crime. We argue that the human capital within a terrorist group captures a group's ability to integrate criminal skill into the organization. The more members a terrorist group has, the higher is the probability that some members possess criminal skills or know someone who does. Additionally, larger terrorist groups need more resources to sustain themselves. The need for resources, coupled with the opportunity to access criminal know-

how, leads us to expect that large terrorist groups should be more likely to possess the capability to become engaged in organized crime. Thus, organizational size should increase my prediction accuracy of terrorist groups becoming involved in organized crime.

Ideology is assumed to have a negative relationship with the involvement in organized crime (Williams, 2012). Ideological motivations are a crucial factor that distinguishes terrorist groups from organized crime, the latter being a purely economic enterprise. For ideological hard-liners within a terrorist organization, engaging in organized crime might equal selling out the core beliefs of the organization. However, Asal and his colleagues find that ideology per se might not be the most appropriate predictor but rather needs to be disaggregated (Asal and Rethemeyer, 2008). They find no significant effect of religious ideology, but a positive effect of ethno-political ideology. However, it is debatable whether they find an effect of a specific political mind-set or instead identify opportunities for the intended activities, in their case drug trafficking. They argue that strong links to society provide opportunities to diversify and to rely on their ethnic constituency to actively support them in their criminal endeavors. Thus, they capture an environmental variable of access to resources in their area.

The *organizational structure* of terrorist groups varies between centralized hierarchies and decentralized networks. How a terrorist group is structured affects the distribution of power over decision-making within the group (Silke, 2008).[13] In a centralized hierarchy, a central authority has discretion over the decision-making process and distributes the tasks and responsibilities from the top, down to the lower levels of the hierarchy. Crucial to a central organization is that information, which is necessary for directed decision-making, is integrated on the upper levels (Podolny and Page, 1998). Decentralized networks, on the other hand, are not controlled by one central authority. There could be multiple decision-makers that do not necessarily pursue the same strategic goals. Each cell consists of individuals with specific goals and skill-sets that are not integrated by a higher authority (Podolny and Page, 1998). The common consensus is that illicit groups adopt decentralized structures to cope with changes in international law enforcement, globalization, and technology, allowing them to diversify revenue streams (Hutchinson and O'Malley, 2007; Mullins, 2009). In a study of the topology of clandestine networks, Xu and Chen (2008) use computational models to show that networks are generally effective at connecting with unrelated network nodes. Other studies support this finding of decentralized structures driving intergroup cooperation (Asal, Milward and Schoon, 2015; Fiedler, 2008; Makarenko, 2004*a*; Mincheva and Gurr, 2013; Picarelli, 2006). Centralized terrorist groups need to put a higher premium on their survival, since their structural integrity is easier to disrupt, thus shying away from engaging in organized

[13] For more information concerning the decision-making process in centralized and decentralized organizations, see chapter 3.

crime and instead turn to other types of funding (Eilstrup-Sangiovanni and Jones, 2008). Centralized groups are more likely to be funded by external benefactors or states, as those donors prefer to give money to organizations that are capable of monitoring the use of resources (Shapiro, N.d.). Given that the engagement in crime increases a terrorist group visibility, a terrorist group which has access to other fundraising opportunities, is expected to rather use those and stay away from crime. Thus, I expect the organizational structure to increase the accuracy of my prediction of terrorist groups becoming involved with organized crime.

Having *multiple bases* in various countries and regions increases the opportunities to engage in organized crime given the sheer number of locations. Organized crime is mostly transnational in nature (Williams, 2001). A terrorist group which has a structure that spans multiple countries can capitalize on this infrastructure. Thus, terrorist groups are not only more likely to encounter actors of organized crime, but they can also readily use their geographical reach for criminal revenue generation along with political violence. Thus, I expect the variable of multiple bases having a positive effect on the predictive capacity of my model.

Organizational age can have a twofold effect on the likelihood of engaging in organized crime. Terrorist groups that have existed for a long time may have a clear and established political objective, and they may have proven that they are capable of sustaining their organization over time. Thus, they might not engage with organized crime absent of substantial external changes, which cut their established resource streams. Furthermore, they might rely on a set cadre of members who might not be open to engaging with organized crime but consider it a danger to their ideological integrity. Conversely, established terrorist groups might be preferred partners for organized criminal enterprises. Criminal organizations might prefer becoming involved with terrorist groups that have proven to be able to sustain a prolonged campaign and constrain impulsive and amateurish actions (Galeotti, 2009). Younger terrorist groups, however, may engage with organized crime, since they need all potential revenue options to get their campaign started. Their attacks need to signal their resolve to their opponents and supporters alike, which require constant and substantial resources. Engaging with organized crime provides them with valuable resourcing opportunities. In sum, I expect organizational age to have an effect on the predictive capacity of my model.

Previous studies relate higher levels of *lethality and the diversity of attack types* to the amount of resources a terrorist group has (Horowitz and Potter, 2014; Young and Dugan, 2014). All else equal, it may be expected that those groups rather engage with organized crime to benefit from its high revenues. Furthermore, the interaction with organized crime does not restrict terrorist groups to the same extent as an external donor might do. By diversifying their revenue generation portfolio to organized crime, they

do not only gain the necessary resources, but also keep their autonomy (Vittori, 2011). Thus, both the lethality and the diversity of attack types are expected to increase the predictive capacity of my model.

5.4.2 Environment-level characteristics

The most widely accepted conditions that affect the need and opportunities of terrorist groups to engage in organized crime concern the environment of both terrorism and organized crime. In his often-quoted statement, U.S. Attorney General John Ashcroft notes in 2002, "they thrive in the same conditions, support each other, and feed off each other."[14] A common intuition about the environment's effect is that failed states provide terrorist groups and organized crime actors with opportunities and space to work together or terrorist groups to enlarge their tactical portfolio by engaging in criminal activities themselves. In the absence of governmental authority, terrorist groups can develop the infrastructure necessary to get engaged in organized crime. Abdulkander Sinno (2008) highlights a safe haven to be the crucial contingency affecting multiple functions of a group that relies on secrecy for facing disruption efforts allowing terrorist groups to regroup, train, and coordinate their activities.

Weak states lack coercive capacity, which is useful for establishing a thriving criminal market and for politically motivated terrorists to set up their infrastructure (Meehan, 2011; Rotberg, 2003). Those locations offer ample economic opportunities for organized crime, which often is the only source of income for people living in those regions. Under these circumstances, criminal enterprises can establish a shadow economy and feed off the weakness of state structures by appropriating governance functions (Makarenko, 2004*a*). Such an unregulated environment which lacks the control and governance of a recognized entity creates opportunities for interactions between terrorism and organized crime (Freeman, 2011). Where violent actors fight each other, criminal enterprises often rely on external protection to secure their infrastructure. In such an environment, the engagement with organized crime seems not only to benefit terrorist groups and their income generation, but also actors of organized crime. If terrorist groups collaborate with organized crime enterprises in areas where the state authority is weak and violent actors many, terrorist groups can offer their militarized support (Felbab-Brown, 2010; Forest, 2013). Felbab-Brown (2013) discusses the cases of Colombia and Afghanistan to illustrate this mechanism. In those countries, the local farmers plant coca or poppy plants, generally having to rely on the cartels for payment. Some terrorist groups possess the firepower to defend those farmers from rival cartels, the government, or other actors with incentives to disrupt production. Terrorist groups can use such protection services as a strategy to generate funds and to promote their legitimacy. If terrorists engage in crimes, they provide business opportunities to the population themselves, strengthening their

[14] Cited in Costigan and Gold (2007, p. 29).

legitimacy. Several case studies provide evidence for these mechanisms (Eccarius-Kelly, 2012; Flanigan, 2012; Piazza, 2012; Shelley and Picarelli, 2005; Williams, 2012). Thus, weak states increase both the likelihood for terrorist groups to engage in criminal activities and for terrorist groups to work together with actors of organized crime. We expect the variable for weak states to increase the predictive accuracy of my model.

Especially in regions with no state authority more violent non-state actors will seek refuge. This sets the conditions for competition for resources between various groups. The *existence of multiple terrorist groups* within a country can increase the likelihood of terrorist groups engaging in organized crime in two ways. First, competing terrorist groups need more resources. Theories of outbidding find that competing terrorist groups carry out increasingly lethal attacks resulting in a greater need for resources (Conrad and Greene, 2015; Young and Dugan, 2014). They also have to share rare resources with other terrorist groups operating in the same realm, which can drive them towards organized crime to enrich their revenue streams. Second, in a setting of multiple violent non-state actors, existing organized crime enterprises require more protection to maintain their enterprise.

Nevertheless, the existence of other terrorist groups in the same environment might also decrease the likelihood of engagement. Terrorist groups can cooperate with other terrorist groups to exchange resources.[15] A higher amount of terrorist groups within one environment increases the opportunities to engage in resource exchange relationships with those groups. This might be especially attractive for terrorist groups whose members and supporters oppose criminal behavior. Collaboration with a politically motivated terrorist group twith even a similar ideology might be preferred over a profit-seeking criminal actor. Thus, existence of other terrorist groups within the same environment can decrease the need and the opportunities for a terrorist group to engage in organized crime. Both causal mechanisms have merit. The empirical observation, however, is the same. We expect that the existence of multiple terrorist groups in a country increases the accuracy of predicting the engagement in organized crime of terrorist groups.

Rich and functioning countries provide unique opportunities for criminal engagement. Just like legal businesses, illicit enterprises benefit from *well-developed economic and financial structures* where they can function as a predator on the economy (Mehlum, Moene and Torvik, 2003). At the same time, countries with a high GDP have the incentives to keep illicit economies at bay, fight terrorism and have the capacities to do so. They can undertake substantial counter-measures to both terrorism and organized crime constraining their operating environment (Forest, 2013, p. 176). This can decrease the

[15] See chapter 3 for more information concerning the reasons terrorist groups cooperate with other terrorist groups and the mechanisms of resource exchange.

likelihood of terrorist groups being engaged in organized crime. In contrast, under pressure generated by governmental counter-measures, terrorists might be compelled to pursue any option for resource generation possible (Forest, 2013, p. 176). Therefore, I expect GDP to increase the accuracy of my predictive model.

The literature about the connection between democracy and terrorism is divided. *Democracy* is found to be either promoting or restricting terrorism depending on the circumstances (Chenoweth, 2013; Eubank and Weinberg, 1994). From a revenue generation point of view, democracies offer both opportunities and restrictions for terrorist groups to engage with organized crime. Open political systems offer various legal economic opportunities. Therefore, it might be more difficult to mobilize criminal resources in a democracy, since it is less attractive for people to divert from legitimate forms of business. From this point of view, democracy decreases the likelihood of a terrorist group accessing organized crime structures for its purposes. Conversely, democracies are less restrictive than autocratic systems. Thus, they provide political and economic incentives for both terrorists and criminals to set up their operations. Under such conditions, terrorist groups can either collaborate with actors of organized crime or set up their own infrastructure, leading us to expect a positive impact of the variable democracy on the accuracy of my model.

The proposed effect of *population size* is similarly ambiguous. The larger the population in the home-base country of a terrorist group is, the larger is the group's potential for mobilizing human capital and thus for tapping into various kinds of resourcing options. Following this logic, terrorist groups can either rely on less risky types of resourcing outside organized crime, or they can get involved with it since the likelihood of having the opportunity to do so increases with a larger size of the population.

Considering the ambiguity of both theoretical arguments and preliminary evidence for establishing a causal relationship between these factors and a terrorist group's engagement with organized crime, I instead focus on evaluating the predictive efficacy of these mechanisms for understanding variation between organizations that engage in criminal activity, and those that do not. As such, I cannot address issues of causal process, but I can provide evidence concerning which variables may merit further consideration for deductive hypothesis testing. We can provide rigorous insight into the specific variables that may be of greatest interest for future research by examining predictive accuracy, predictive importance, and estimated substantive relationships outside the assumptions of a regression framework.

5.5 Research design

To explore the relationship between engagement in criminal activity and the factors outlined above, I propose an inductive research design that is meant to leverage the strengths of the statistical learning approach to quantify both the predictive power and the substantive relationship of these variables. Statistical learning is a methodology that seeks to integrate statistical models and algorithms with data partition strategies to estimate the out-of-sample accuracy of a set of predictor variables. The goal of such an approach is to find a reasonable function for which to make predictions about future data.

We believe this design is useful in studying the intersection of crime and terror because it seeks to describe patterns independently from purely deductively driven hypothesis testing. Lo, Chernoff, Zheng, and Lo (2015) find that complex samples of medical and social science data can suggest significant, albeit substantively meaningless, results when it comes to modeling observational data in a hypothesis testing framework. Related to this, researchers using observational data may find statistically significant effects, yet these variables may not actually explain meaningful variation in the distribution of the dependent variable, or even fail to be a useful predictor of future cases (Lo et al., 2015). Such spurious relations are due to several factors, the most important including the absence of random assignment, omitted variable bias, and sample size.

5.5.1 Unit of analysis and scope conditions

Our unit of analysis is the terrorist group. This results in a sample of 183 unique terrorist organizations and includes information on their involvement in criminal activity, organizational characteristics, and environmental conditions. We utilize a cross-sectional unit of observation because systematic data concerning the start and end of criminal activity and collaboration by terrorist organizations is neither well-developed nor easily accessible seeing that such information is clandestine (Raab and Milward, 2003; Xu and Chen, 2008). We argue that the use of group-aggregated data is currently the best approach to investigate this topic. While cross-sectional data lacks precision over temporal patterns in behavior, a focus on between-group variance provides a step into the right direction. We use data from the RAND Database of Worldwide Terrorism Incidents (RDWTI).[16]

5.5.2 Variables and operationalization

Table 5.1 provides relevant descriptive information about each variable included in this study.

[16]For a more detailed definition of terrorism as it is used in the RDWTI, please see chapter 4

Table 5.1: Descriptive statistics for variables used

Number of terrorist groups in sample				183
Numerical variables				
Variable	**Mean**	**Variance (SD)**	**Max**	**Min**
Number of Bases	1.6	0.99	7	1
Polity Score	4.5	5.1	10	-10
ln(Military Spending)	1.9	0.9	9.2	0
Competition	17.7	12.3	45	0.5
ln(Population)	10.4	1.4	13.9	7.8
ln(Real GDP)	8.7	1.2	10.5	0
Attack Diversity	0.04	0.07	0.5	0
Transnational Casualties/Attack	0.51	0.86	5.4	0
Age	21.6	15	90	1
ln(Group) Size	5	2.1	9.2	2.3
Factor Variables				
Variable		**Yes (1)**	**No (0)**	**In percent**
Crime		69	114	37%
Centralized Structure		104	79	56%
Left-wing		69	114	37%
Religious		40	143	21%
Nationalist		68	115	37%
Right-wing		6	117	3.20%

Crime

The protocol for measuring a terrorist group's engagement with organized crime uses open-source documents from journalistic, military/policy, and academic sources. We utilize a standardized search query method to search for these sources, using three databases. These are: 1) Lexis Nexis, 2) Google, and 3) Google Scholar. The query-string used was as follows; group name + (trafficking or production) + (drugs or weapons or humans or money laundering).[17] To be coded as 1 (engagement), sources need to explicitly mention the use of organized crime activity by the group. In cases where there are no sources to point towards such an explicit involvement, the criminal activity is coded as 0. This heuristic is practical and presents a substantive dilemma. Coding groups without a mention may underestimate the involvement in organized crime because of a potential selection bias. Some groups may be new to criminal engagement, or particularly skilled at hiding it. If open source material has yet to catch up with conditions on the ground, or fails to capture well-hidden behavior, there is selection bias towards not finding engagement. If this is the case, there may be more groups engaging with organized crime than would be captured by my data.[18]

[17]Put into practice I use, for example: National Socialist Council of Nagaland + (trafficking or production) + (drugs or weapons or humans or money laundering).

[18]Table A.2 in the appendix provides a list of all terrorist groups that are part of this sample. The table reports whether, according to my research, a terrorist group is involved in organized crime or not along with the organizational structure of each

Regardless of this bias, I argue that the potential for underrepresentation does not hinder my empirical design in a substantial way. By using a resampling method known as k-folds cross-validation, my analysis is more robust to conclusions driven by a single analysis of biased data, and instead computes accuracy by using a series of data permutations. Finally, I assume that there are fundamental differences in visibility between terrorist groups and organized crime. While some terrorist groups may be able to hide their engagement, I argue that the more visible nature of terrorist behavior and the increased scrutiny on violent extremists makes it unlikely that such a bias would be large.

Using these coding rules, the dependent variable is operationalized as a dichotomous measure of organized crime, using a decision rule that codes the variable 1 if a group is coded as having participated in at least one of the sub-measures of engagement with organized criminal activity, and 0 if not.

Organization-level variables

We measure several organizational factors. Given the clandestine character of terrorist organizations, finding detailed information about their internal dynamics is challenging. The majority of my organizational variables are sourced from event-data created by Gaibulloev and Sandler (2013). These variables include logged measures of group size, group structure, number of territorial bases, attack diversity, average number of casualties per trans-national attack, group age, and the ideological disposition of the organization.[19] Gaibulloev and Sandler utilized Jones and Libicki's database concerning terrorist organization longevity (Libicki and Jones, 2008) and RANDs Database of Worldwide Terrorism Incidents.[20] Because the original organizational measures are coded in a panel event-data format, I aggregated most time-series measures using the median value across all group time-periods in the Gaibulloev and Sandler data.[21] The exceptions here are age, ideology, and group structure. For age, I simply used the age at the group's termination, or as of 2017 if the group was still in operation. Ideology remains static in all groups, so no aggregation is required. The organizational structure of the sampled terrorist groups is a dichotomous variable measured as either centralized or decentralized.[22]

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terrorist group.

[19]For information on the operationalization of both the organizational and environmental variables, see Gaibulloev and Sandler 2013.

[20]RAND database of worldwide terrorism incidents. Available at http://www.rand.org/nsrd/projects/terrorism-incidents.html.

[21]Because my predictors are aggregated from panel measures into cross-sections, it is possible that important variation is lost during the aggregation. Appendix A.3 compares the panel means and variance to the cross-sectional measures. Only transnational casualties/attack substantively deviates from the panel measure. The overall comparison gives reason to believe that, on the whole, my aggregation procedure does not fundamentally change the distributional structure of the measures used here.

[22]For more detailed information about the operationalization and coding of this variable, see chapter 4.

Environment-level variables

The second set of predictors captures environmental factors. The environmental variables are also retrieved from Gaibulloev and Sandler (2013). Each variable is measured at a group's main geographic base of operation. The first variable is the operating state's level of democracy, operationalized by using the Polity2 dataset. Next, I include a logged measure of military spending of the state in which a group is based, a logged measure of population, and the states' logged real GDP value. Finally, I include a measure of competition by including a count of the number of other groups within the units geographic area. As with the organizational measures, numeric measures were aggregated by taking the median value of each measure within their respective groups.[23]

5.5.3 Statistical methodology

To carry out my inductively driven statistical learning framework, I utilize random forest classification. The random forest is an ensemble learning method, built on the averaging of individual classification trees to understand how a set of independent variables (predictors) describe the dependent variable (outcome) (Breiman, 2001). Classification trees attempt to partition a set of training observations into the best homogenous split between the binary levels of the outcome variable, conditional on the values of the predictors (James et al., 2013). The classification tree then compares the split found for this set of training observations with a subset of test observations.

When growing the forest, the random forest algorithm builds a pre-specified number of decision trees based on training data. Every time a split in the tree is made, a random sample of predictors is chosen as a subset of prediction candidates from the full set of included predictors, with only one predictor from this subset being allowed to predict each additional branch (James et al., 2013). Each subsequent split takes a new sample of predictors as the forest grows. The logic behind the sampling of predictors at each split is that the algorithm will create a forest of uncorrelated trees, which results in greater reliability across the forest (James et al., 2013, p. 320). As a result, the random forest provides greater predictive accuracy compared to a single classification tree. The predictor split method is robust

[23] By aggregating organizational and environmental measures at the group level, I concede a loss of temporal information. This is problematic in that I cannot parse out time-serial structures that may be important for understanding engagement with organized crime and may mask a problem of reverse causality, or a temporal lag structure that characterizes engagement. While these limitations must be acknowledged, there are two reasons for which it does not decrease the merit of this study. First, multiple indicators at the panel level are essentially time invariant in their original measurements for the group's entire history or sizable amounts of their history (group ideology, group size, structure, etc.). Even if it was feasible to produce true time series measures of engagement, these problems would not necessarily be solved by maintaining the original panel structure. The second reason concerns my strategy. We make no attempt to estimate causal effects and instead focus on how aggregated factors at the group level may be used to accurately predict engagement between different groups, and not when groups adopt or discard engagement opportunities. While these questions are important, I believe that the results here can aid in the formulation of more nuanced theories of engagement by focusing first on between-group variation in engagement.

to outlier values, random noise, unbiased estimates of error, heteroskedasticity, and improves prediction accuracy in test sets. Also, it handles problems such as non-linear relationships, interaction relationships between predictors, missing data, and high dimensionality.

To perform out-of-sample validation, I utilize the .632 bootstrap method. This cross-validation method has been proposed to be a better estimator for out-of-sample accuracy for small-N datasets when compared to traditional methods, such as the leave-one-out cross-validation (LOOCV) method and K-folds cross validation method (Efron and Tibishirani, 1997). We utilize a hundred bootstrapped subsamples to estimate area-under-the-curve statistics, and brier score statistics concerning the out-of-sample accuracy of various classifier specifications. To test robustness, I also include the results of a 10-fold cross-validation analysis in Appendix A.4.

5.6 Results

To evaluate the efficacy of organizational and environmental level factors in predicting engagement with organized crime, two evaluation procedures are used. First, I show how well three specifications of the random forest classifier perform in out-of-sample prediction using .632 bootstrap cross validation. Area under the curve (AUC) scores are used to evaluate the accuracy of a fully specified forest, a forest with only organizational factors, and a forest with only environmental factors. We finally explore variable importance for each predictor for predicting engagement within the fully specified random forest analysis. Building on these analyses, I then produce partial-dependence plots for the most important predictors to estimate the functional relationship between predicted engagement and values within the predictors.

Figure 5.1 displays the receiver operating characteristic (ROC) curves for out-of-sample accuracy for all three random forest specifications. The AUC is used as a statistic for evaluating classifier performance. The AUC scores range within the interval between 0 and 1 with .50 indicating random guessing and 1 perfect prediction. AUC values of .70 to .80 indicate fair predictive accuracy, values of .81 to .90 indicate good predictive accuracy, and .91 to 1 is considered excellent predictive accuracy.

Overall, the random forest specifications tend to do perform fairly well. The fully specified random forest has an AUC of 0.83, indicating good accuracy. Breaking the analysis into predictor subcomponents, I observe an interesting pattern. The organizational factor specification has an AUC of 0.91. This result is close to the fully specified version and is on the bottom end of good predictive performance. In contrast, the environmental factor specification has an AUC of 0.71. This is an almost ten-point drop in performance when compared to organizational factors alone. The fully specified random forest's accuracy is driven mostly by organizational predictors. Environmental factors may only

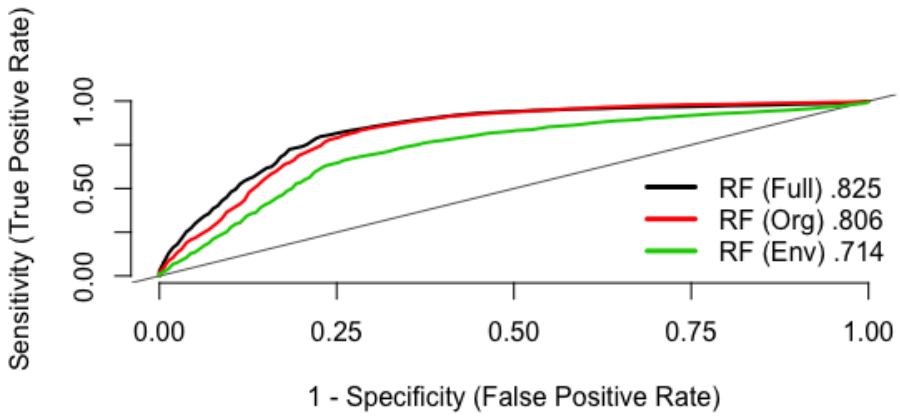

Figure 5.1: ROC curves for Random Forest specifications

marginally increase my ability to predict engagement with organized crime out-of-sample. An AUC of 0.71 is on the border between fair and poor predictive accuracy.

If organizational factors are better predictors than environmental factors, then it is valuable to dig deeper into which specific variables are driving predictive performance. The random forest classifies predictor importance by running a classifier analysis, first with the variable included, and again with the variable's values randomly permuted to stochastic noise. Importance is measured as the average decrease in predictive accuracy when permuting to random noise from a predictor's original values. Figure 5.2 displays standardized variable importance results for the random forest classifier. Group size and group ideology remain near the top of importance, with group size having the largest decrease in accuracy when left out. The environmental variables military spending in a country of operation and mean casualties per transnational attack make up the next group of most important predictors. Alongside centralized group structure, real GDP, and group age make up the middling variables in terms of importance.

Corroborating the analysis in figure 5.2, variables that reach a minimum threshold of 0.01 importance, five of the seven variables are organizational factors. Below this threshold, four of the five predictors are environmental. Interestingly, the number of bases of a group decreases the predictive performance of the random forest. Combined with the negative influence of this predictor, and the general dearth of importance for many of the environmental factors, it is clear why the environmental factor specification performed poorly compared to the full and organizational factor specifications, respectively.[24]

Taking the two analyses above in tandem, two patterns are suggested by the data. First, a fully specified random forest performs well when estimating out-of-sample accuracy for engagement with

[24]The effects are not very large. Future research can improve the measurement of variables to increase the quality of analyses and the magnitude of effects.

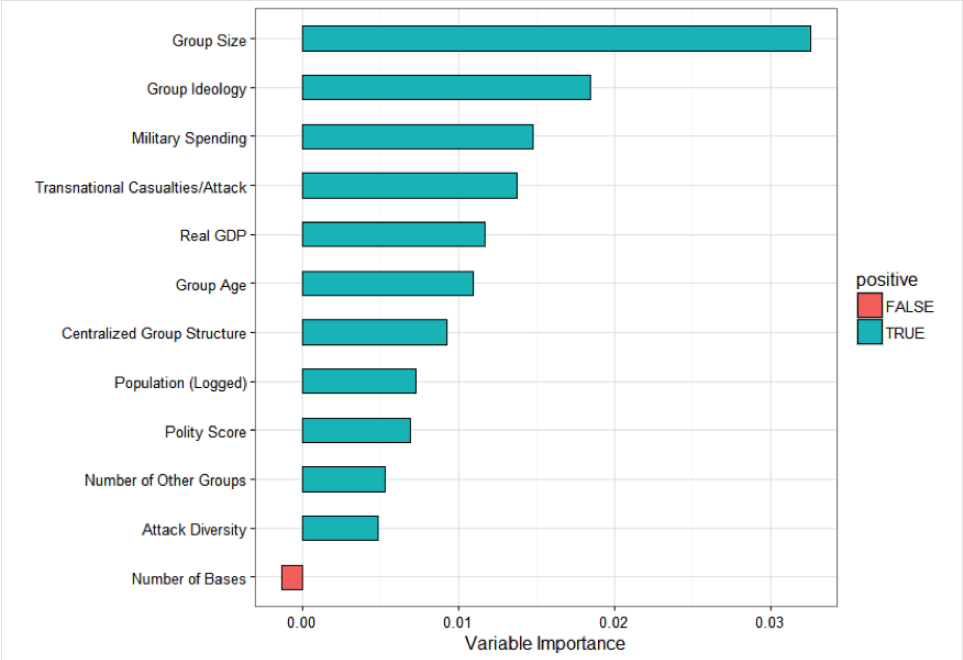

Figure 5.2: Variable importance for Random Forest

organized crime. Second, it appears that organizational characteristics are driving most of this predictive performance when compared to environmental factors. Yet, this leaves several substantive questions unanswered. A criticism of the random forest method is that it can appear as a "black-box". It may provide accurate predictions, but the relationship between predictors and outcome is not always clear to the analyst. Fortunately, the use of partial dependence plots can allow us to estimate, and visualize, the functional relationship between each predictor and the outcome of interest.

Figures 5.3 and 5.4 display the partial dependence plots for the eight most important predictors as indicated by the random forest classifier. Factor variables display their relationship using boxplots, while numeric variables display their relationship using non-linear line plots. The y-axis displays the predicted probability of involvement in crime. Group size shows an increase in the expectation of being classified as having criminal involvement as the ordinal group size value increases, with less difference between the two largest categories. Ideology shows religious organizations as having the highest classification expectation, with nationalist groups having the second highest. Leftist and right-wing groups are the lowest and are difficult to superficially tell apart. Military spending and transnational attack activity show similar functional relationships, with the expectation of being classified as having criminal involvement. They show a sharp positive relationship as predictor values initially increase, and a clear plateau effect that levels off the expected classification numbers.

GDP shows a non-linear negative relationship with criminal classification. As GDP increases, I see

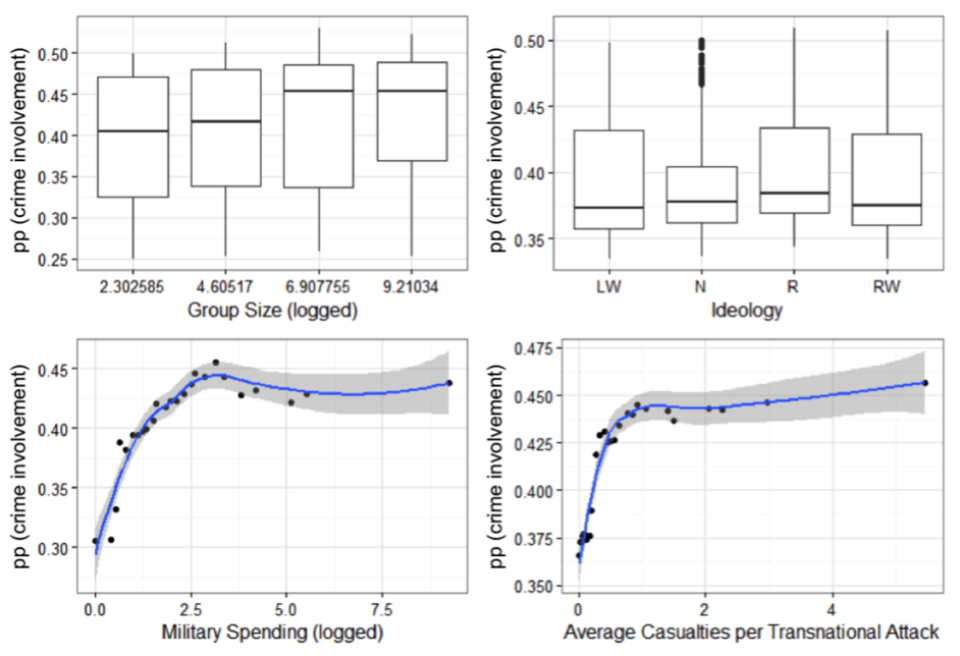

Figure 5.3: Partial dependence plots for four most important predictors

a decrease in expected classification, but with a small parabolic positive shift near the logged GDP value of 10. Group age shows the most linear relationship of the final four predictors, with a steady positive increase in expected classification with group age. For centralized group structure, the random forest agrees with the logistic regression, showing centralized group structure (1) as having a higher mean expected classification than groups with non-centralized group structures. The main difference is that the mean values between the centralized and decentralized categories do not seem to be superficially very different from each other. Finally, population displays a highly non-linear relationship with classification of criminal activity. Groups active in countries with larger populations tend to have higher expected classification values, with a structural break occurring around the logged value of 10.

5.7 Conclusion

The goal of this study was to utilize an inductive machine learning approach to explore the predictive accuracy of organizational and environmental factors in classifying terrorist engagement with organized crime. It also explored the relative importance of predictors and utilized partial dependence plots to draw the controlled-substantive relationship between predictors and engagement outcomes.

Organizational factors outperform environmental factors across all classifier specifications. This is an interesting finding, considering previous studies that focus on environmental characteristics to explain the existence of a nexus between terrorism and organized crime (Eccarius-Kelly, 2012; Flanigan,

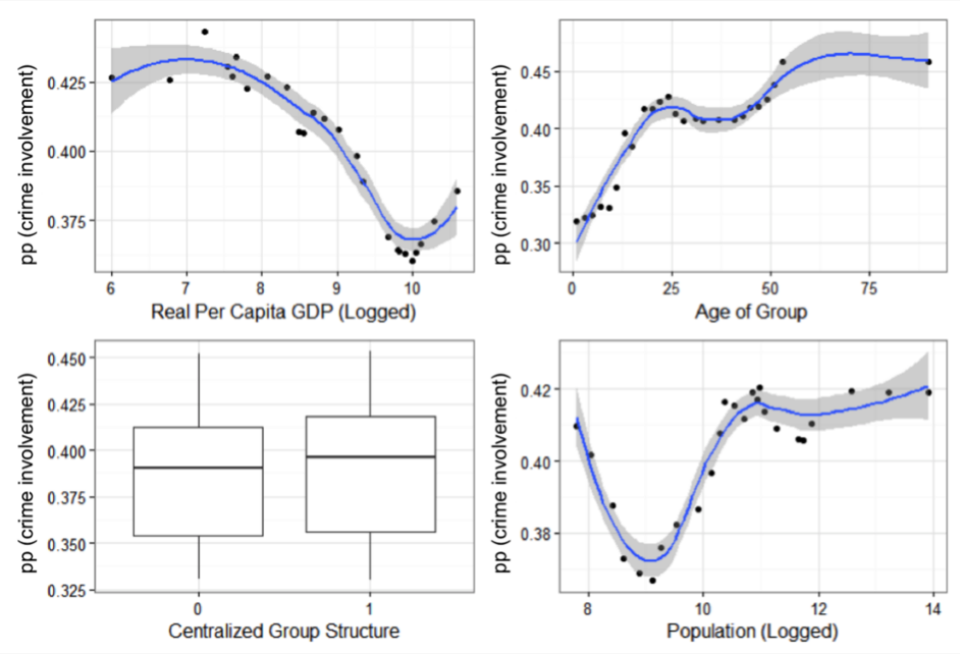

Figure 5.4: Partial dependence plots for second most important predictors

2012; Freeman, 2011; Piazza, 2012; Williams, 2012). The tenor of those studies is that context factors provide opportunities for criminality and terrorism to flourish and combine their assets. Based on this assumption, these studies assert to explain why some regions in the world are more likely to host greater interaction of terrorism and organized crime. Our results suggest a substantive impact of organizational variables that are oftentimes neglected in large-n studies due to difficulty obtaining data on those variables. However, as my findings suggest, not focusing on organizational factors, may bias the results substantially and systematically.

Knowing this, we must yet be careful in interpreting the results of this study. Our inductive approach cannot solve problems of causal inference and I cannot claim that organizational factors are more causally related to crime than environmental factors. We can only suggest that they are substantively important for predicting out-of-sample cases of criminal activity. A second qualification of these findings is that I could not include all variables which may be of substantive importance to the crime-terror nexus. We chose well-known factors found within the extant literature, but even the fully specified random forest remained far from perfect when classifying out-of-sample. Variables such as diaspora support, degree of border openness, geographic proximity to certain regions, and/or well-established criminal organizations are examples of factors that can be of interest to future studies. Yet, these would also require substantial effort to observe and operationalize. Additionally, my cross-sectional approach cannot capture potentially interesting patterns of behavior that could occur temporally between terrorist organizations and crime. Lastly, the exploration of the relative importance of predictors suffers from

small effect size. Future research can work on identifying better measurements to improve the quality of prediction and the magnitude of effect.

Knowing these limitations, I still believe that the findings of this study are of importance to the crime-terror literature. This is the first study to evaluate the predictive importance of factors thought to be associated with increased crime-terror interaction. While I do not propose a new theoretical approach, my inductive analysis can help evaluate the existing theoretical mechanisms and guide future theory formation and testing in three ways.

First, the results suggest that future studies may benefit from focusing on organization-based mechanisms for explaining the crime-terror nexus, and the potential interaction between organizational factors and environmental cues. Our findings suggest the importance of focusing more on organizational factors. The accuracy of prediction may be increased by including other organizational variables or by focusing on how environment and the organization affect each other. Second, my set of predictors used here leaves room for improvement. Going forward, the literature may benefit from process tracing analyses of groups that engage in criminal activity as a strategy for identifying additional mechanisms. Organizational variables are difficult to measure as they are mostly clandestine. In-depth case-based studies may help to inform strategies on how to measure certain organizational characteristics and identify new variables.

Finally, the results suggest that we should be more open to analytical methods apart from null-hypothesis testing and the use of regression models. An algorithmic approach, such as random forest, outperformed the more well-known logistic regression. The complexity of observational data concerning terrorist-group behavior seems to be poorly captured by the regression modeling approach when compared to random forest. With increasingly greater access to machine learning methodologies, I am additionally able to unpack the "black box" of statistical algorithms and explore the functional relationship between predictor and outcome in a way more familiar to those trained on regression modeling. Adding to this, the use of out-of-sample predictive accuracy over null-hypothesis testing methods appears to be a viable alternative for evaluating the potential importance of theorized mechanisms in a more concrete way than relying on statistical significance alone.

In the next chapter, I return to the method of null-hypothesis testing, as I analyze the moderation effect of the organizational structure of a terrorist group on its social capital gained through cooperation with other terrorist groups on its operational capability.

Chapter 6

The network effect on the capability of terrorist groups[1]

"Almost anything is, in principle possible through collaboration because you are not limited by your own resources and expertise. You can, in principle achieve whatever vision you may have by tapping into resources and expertise of others" (Huxham and Vangen, 2005, p. 3).

6.1 Introduction

On December 21, 1975 a group of six terrorists stormed a meeting at the headquarters of the Organization of Petroleum Exporting Countries (OPEC) in Vienna killing several people and taking several ministers hostage. The Venezuelan terrorist Illich Ramírez Sánchez, aka Carlos, led the group and was working together with Germans and Palestinians to carry out the attack (Martin, 2010, p. 281). Members of the Revolutionary Cells (RZ) and the Popular Front for the Liberation of Palestine (PFLP) combined their assets and managed to successfully siege the building and escape afterwards. This act of terrorism is an example of operational cooperation. It illustrates the rationale of cooperation between terrorist groups. Facing limited capacities to adequately perform their attacks terrorist groups ally with each other by exchanging missing resources to overcome these limitations.

This example motivates my research question for this chapter: *Why are some terrorist groups able to carry out attacks with sophisticated weapons, while other terrorist groups are not?* To answer this question, I explore how terrorist groups can capitalize on their relationships with other terrorist groups to acquire external resources and how they are equipped to manage their resources internally.

[1]This chapter is based on a joint research project with Anna-Lena Hönig, which was presented at an earlier stage at the International Studies Association 57th Annual Convention, 2016, Atlanta, Georgia.

In this chapter, I explore why terrorist groups differ in what they manage to do. I capture this with the observable variation of weapons used in terrorist attacks. My argument links what I call the "sophistication of weapons" used in an attack to a perpetrator's resources. Terrorist groups with more resources can carry out attacks displaying a higher sophistication of weapons than terrorist groups with few resources. I argue that terrorist groups cooperate with other terrorist groups to enhance their resource endowments. I conceptualize cooperation between terrorist groups as terrorist groups jointly carrying out an attack.[2] Based on these instances of cooperation, I generate a network of terrorist groups. In this network two terrorist groups are connected if they cooperated at least once. Through these connections terrorist groups can generate relational rents.[3] Based on the position within the network, some terrorist groups can access more and more diverse resources from other terrorist groups. This concept of profiting from the connections someone has is called "social capital" (Bourdieu, 1986; Coleman, 1988; Putnam, 2000).

In addition to explaining the resource acquisition of terrorist groups with their connections to other terrorist groups, I argue that it matters how well a terrorist group is equipped to manage the resources internally. I claim that this capacity depends on a terrorist group's organizational structure enabling centralized terrorist groups to manage resources more efficiently compared to decentralized terrorist groups. The organizational structure determines how decision-making is distributed within the organization and how resources can move through the organization. Terrorist groups have to manage the resource acquistion and their efficient allocation within the organization. In this chapter, I explore the effect of a terrorist group's position within the network and its organizational structure on what it manages to implement. Each characteristic influences a terrorist group's resource stock independently. I also assess if and to what degree the impact of a terrorist group's network position is conditional on its organizational structure.

With this approach, I combine intra-organizational dynamics and inter-organizational relationships. The literature to date has focused on one or the other. My theoretical argument highlights the need to combine both approaches. Focusing on resource acquisition and resource exploitation provides a better understanding of the process by which terrorist groups gain value from resources to enhance their operational capability. To elaborate my argument, I rely on management literature that consideres organizations' performance both in terms of their external resource environment and their internal dynamics.[4]

[2]This is a practice regularly done in network analysis. Actors are linked when they are present at the same event. Thus, two people can be linked when they are at the same party or taking the same class at university (Borgatti, Everett and Johnson, 2013, p. 4). The substantial meaning needs to be attributed by the context. Much like it can be reasonably assumed that students might at least know of each other once they have taken the same class, terrorist groups know each other if they are active in the same attack.

[3]Relational rents are explained in chapter 3.

[4]See chapter 3 for more details on this literature.

By transferring those mechanisms to terrorist groups and their resource acquisition and allocation, I introduce insights gained from studying firms to terrorism research.

My argument and hypotheses are also informed by the assumptions of social network theory (e.g., Borgatti and Foster, 2003; Wasserman and Faust, 1994). I apply social capital theory, which uses concepts of social network theory to explain how performance outcomes can be explained by the external relationships of an actor (Coleman, 1990). This approach highlights a terrorist group's reliance on its ability to access and extract necessary resources from other actors for their operations (Duijn, Kashirin and Sloot, 2014; Kinsella, 2008). I argue that the depth, breadth, and efficiency of resource exchange hinges upon the interactions terrorist groups have with other terrorist groups.[5] Social network theory provides the conceptual framework for the analysis and the empirical tools to test my hypotheses.

In this chapter, I anaylze the variation of the network effect on the capbility of terrorist groups that engange in cooperation. This means, I do not explain, why terrorist groups that cooperate fare worse than those that cooperate. Instead, I explore the consequences of various degrees of cooperation. I compare those terrorist groups that cooperate only little with those that cooperate more. This selection is grounded in the network approach of this chapter. To be part of the network, a terrorist group needs to have at least one connection to another terrorist group. If a terrorist group has no connection at all, it has no link to the network. With such a sample selection strategy I can explain how the position in a network relates to different possibilities to access resources. I analyze how the degree of cooperation influences the amount of resource endowment and not how terrorist groups that cooperate distinguish themselves from terrorist groups that do not cooperate.

I argue that the position of a terrorist group within the network affects its resource stock, thereby affecting what it is able to do. I call this the operational capability. A terrorist group's operational capability is assessed by its observable activities. The relationship between the resources and the performance of a terrorist group is discussed in chapter 3. In this chapter, I measure the capability of a terrorist group with the sophistication of weapon displayed in an attack.

I classify weapons based on their accessibility and simplicity of usage. I argue that the sophistication of weapons used in attacks provides valuable information about the capability of terrorist groups as it directly links their repertoire of cognitive and material resources, to features of the attack. It provides a more immediate assessment of what a terrorist group can do, while distancing itself from approaches that are used to assess what a terrorist wants to do. Previous studies measure the capability of a terrorist groups with the lethality of an attack (Asal and Rethemeyer, 2008; Horowitz and Potter, 2014). Merely

[5]This argument stems from the management literature (Yli-Renko, Autio and Sapienza, 2001, p. 593).

counting bodies can be misleading depending on the strategic intention behind the attack.[6] The type of weapon used in an attack, however, informs about the resourcefulness of terrorist groups. This is relevant for weapons requiring high levels of sophistication, such as, for example, nuclear devices. Even supposedly simple weapons, such as handguns, kitchen knives, or automobiles require some kind of knowledge. While the explicit knowledge about how to use a handgun or drive a car might be easily attainable online, each weapon requires tacit knowledge to be successfully used in an attack. An attacker driving a truck into a crowd, for example, still needs to know how to drive. Additionally, some tactical supervision is beneficial. Here, the attacker might need to be advised on where and when to hit a target. This approach is expanding upon previous research on operational capability that focuses on attack type or target type (Young and Dugan, 2014).

My findings suggest connections to other terrorist groups can increase a terrorist group's operational capability. They show that focusing on a terrorist group's position within the network of cooperating terrorist groups explains part of the variation in operational capability. Furthermore, attacks carried out by terrorist groups with a centralized organizational structure have a higher operational capability and this effect of cooperation is moderated by the organizational structure. These findings support my argument about the importance of both, resource acquisition and allocation, for the operational capability of a terrorist group.

I start by elaborating my theoretical argument linking the operational capability of a terrorist group to its social capital and its organizational structure. I derive hypotheses concerning a terrorist group's direct connections, its embeddedness within the network, and its organizational structure. The final hypothesis relates the operational capability of a terrorist group to an effect of network position that is conditional on the terrorist group's organizational structure. After that, I explain my empirical strategy and present my results. I conclude this chapter with a critical discussion of my findings.

6.2 The social capital of terrorist groups – a network perspective

The theoretical argument I make in this chapter revolves around the question of how the network position of a terrorist group can provide information about the flow of resources between terrorist groups in a network. In order to analyze this relationship, I describe the mechanism that links the individual group's network position to its operational capability.

I use social capital theory to explain how connections between terrorist groups affect the operational capability of each group (Bourdieu, 1986; Burt, 2007; Coleman, 1988; Granovetter, 1973, 1985; Putnam,

[6] A detailed account of the strategic intention behind a terrorist attack is provided in chapter 2.

2000).

My theoretical reasoning is based on the assumption that patterns of intergroup relations are consequential for understanding a terrorist group's activities.[7] The social capital approach is frequently used in studies of strategic management. Borgatti and Lopez-Kidwell (2011, p. 48) explain the mechanism of capitalization as the process where "nodes acquire ideas, resources, and opportunities through their ties. This process either directly increases their human capital or increases their ability to exploit their human capital, which in turn contributes to their success in terms of performance and rewards." Firms are able to enhance their performance if they are located in a superior network position (Gulati and Garigiulo, 1999; Gulati, Noria and Zaheer, 2000; Portes, 1998; Reagans and Zuckerman, 2001; Tsai, 2001). These studies link the structural embeddedness to behavioral outcomes of the actors in the network. They find embeddedness to correlate with having good ideas (Burt, 2004), more opportunities (Lin and Dumin, 1986), or enhanced status (Lin, 1999).

In this chapter I use social network analysis as an approach both in terms of theory and analytical methodology. Social network analysis includes a theoretical message that is based on the perspective of actors not solely in terms of their attributes but in terms of their relations (Wasserman and Faust 1994). From this perspective, the concept of social capital is defined as relational resources in various studies (e.g., Bourdieu, 1986; Bourdieu and Wacquant, 1992; Coleman, 1988; Portes, 1998; Putnam, 2000). Terrorist groups possess social capital if they attain resources from their relations with other terrorist groups via their network connections. I do not aim to explain why some terrorist groups work together and others do not. Instead, I investigate the consequences of networked interaction on the activities of terrorist groups that cooperate with others. I assess to what extent the position of a terrorist group in the network correlates with its operational capability.

Social network analysis is frequently used to understand terrorist groups' behavior and the behavior of individual members of terrorist organizations (Enders and Jindapon, 2009; Enders and Su, 2007; Helfstein and Wright, 2011; Magouirk, Atran and Sageman, 2008). They provide network-related explanations for radicalization (Helfstein, 2012; Sageman, 2004), focus on the distribution of power and control within an organization (Magouirk, Atran and Sageman, 2008), or apply network methodology to case studies, which analyze tactical networks (Abuza, 2002; Cleaver, 1998; Elison, 2000; Wayland, 2004; Zanini, 1999). Those studies aim to understand how the connectivity of terrorists and terrorist groups affects the diffusion of specific tactics. Horowitz (2010) identifies Hizbollah and AQ to be key actors in the diffusion of suicide tactics. Both groups provide operational knowledge to terrorist groups enabling them to use suicide tactics.

[7] I provided a detailed assessment how cooperation between terrorist groups translates into more resources in chapter 3.

The social capital approach has also been used to explore strategic positions of individual actors in criminal networks (Duijn, Kashirin and Sloot, 2014). Previous research finds that illicit actors rely on their ability to extract resources, necessary for operations, from their social network (Carley, Lee and Krackhaardt, 2002; Coles, 2001; Klerks, 2001; Natarajan, 2006; Schwartz and Rouselle, 2009; Sparrow, 1991).[8] They find that actors derive power and influence from their position in the network if they can control the flow of resources. Their power increases the more other actors rely on them to pass on resources. Thus, a beneficial position for a terrorist group is to have many connections, to be linked to terrorist groups that are themselves well connected (Boissevain, 1974), or to be positioned between two or more terrorist groups that are dependent on it to pass on resources (Morselli, 2001; Morselli and Roy, 2008). Those three mechanisms are evaluated in this chapter.

Using the network approach to social capital, I argue that differences in terrorist groups' operational capability are rooted in their different positions in the network that determine their access to resources of other terrorist groups (Tsai and Goshal, 1998). The central assumption of this approach is that being centrally located within the network increases the probability of accessing valuable resources due to topological advantages (Ibbara, 1993). Put simply, the structure of the network helps determine what individual actors are able to do. This concept is summarized in the so-called "resource-flow model" of network theory, in which ties are viewed as conduits for resource flows (Borgatti et al., 2009).[9] This claim is in line with previous literature on related issues, such as a terrorist group's longevity (Phillips, 2012), lethality (Asal and Rethemeyer, 2008), access to certain kinds of weapons (Asal, Ackerman and Rethemeyer, 2012), or adoption of a specific tactic (Horowitz and Potter, 2014). These studies all focus on the interaction between distinct organizations and reason that more direct connections lead to better outcomes. It captures the mechanism of direct transmission from actor to actor (Borgatti et al., 2009, p. 894). I argue that terrorist groups form a cooperative network to transmit resources via their ties, and thus increase their capabilities affecting their performances. This approach contrasts research that focuses on the individual terrorist group's characteristics to explain its behavior. In my approach, the network position may provide opportunities to extract resources from the social environment of a group or constrain a terrorist group's access to external resources.

6.2.1 Direct connections to other terrorist groups

I argue that terrorist groups that are more centrally located within the overall network have more access to resources and are, therefore, more likely to have a higher operational capability. Resources are

[8] A more detail description how terrorist groups extract resources from the environment is provided in chapter 3.

[9] For a comprehensive account of types of ties see Wasserman and Faust (1994, p. 18).

transmitted via connections to other terrorist groups. Terrorist groups that are able to complement their own resources with those from other terrorist groups can mitigate their own resource shortage. They can carry out attacks that were impossible without the resources of other terrorist groups. Conducting a terrorist attack requires multiple resources as elaborated in chapter 3. The more sophisticated an attack, the more (diverse) resources a terrorist group requires. A terrorist group that has many direct connections has the opportunity to access multiple and potentially diverse resources. Such a terrorist group is expected to show higher operational capability. The advantages and disadvantages of having many direct connections are discussed in chapter 2. While the transaction costs rise with additional connections, I argue that the amount of direct connections positively correlates with the operational capability of a terrorist group. Furthermore, terrorist groups with multiple ties to other terrorist groups can compensate the loss of one tie.

Terrorist groups with only one or few ties substantively loose their access to external resources should those ties be severed. Terrorist groups "can access knowledge, information, personnel, financial reserves, and material that might otherwise be unavailable" (Asal and Rethemeyer, 2008, p. 440). Several examples illustrate this mechanism. The introductory example highlights how FARC was able to carry out hit-and-run tactics in urban settings due to the help provided by memebers of PIRA (Ward and Hackett, 2003). German militants supported the Palestinian Black September carrying out the attack at the Munich Olympics in 1972 (Alexander, 1989). In 1992, Hamas and Palestinian Islamic Jihad (PIJ) cooperated with Hizbollah to enhance their tactical repertoire and improve their operational effectiveness, resulting in increased casualties per attack (Horowitz and Potter, 2014). To summarize, terrorist groups with multiple direct connections are expected to have higher operational capability. Those ties allow a terrorist group to aggregate resources and to receive help carrying out attacks.

Hypothesis 1 (Number of direct connections): Terrorist attacks that are conducted by terrorist groups that have more direct connections to other terrorist groups are more likely to display a higher operational capability.

6.2.2 Embeddedness within the network

Aside from having many direct connections to other terrorist groups it is also helpful to be connected to terrorist groups that are themselves well connected. Several scholars find that the type and magnitude of resources, which are available to an actor depend on the network connections of the actors oneself is connected to (Adler and Kwon, 2002; Bonacich, 1987; Lin, 1999). Granovetter (1973) famously

defines the "strength of weak ties," capturing the usefulness of connections based on the number of connections a partner has. This approach accounts for the importance to focus on resources that originate beyond a terrorist group's immediate neighborhood. Those resources are not immediately accessible by a terrorist group but need to move through the extended network ties of its partners. A terrorist group can benefit greatly from these resources as they are potentially different from their own stock of resources and, hence, are complementary. Management and sociological research defines the concept of embeddedness to capture the effect of the social context, meaning the connectivity between actors, on their economic behavior (Granovetter, 1985). Research finds embeddedness to be positively correlated with performance (DiMaggio and Louch, 1998; Gulati, Noria and Zaheer, 2000; Uzzi, 1996, 1997). In particular, Hansen (1999) finds that organizations that are embedded in a network are able to identify and acquire the resources they need.

Thus, it is not just the number of connections that is relevant, but it is "about the value of connections" (Borgatti and Foster, 2003, p. 993). It matters to whom a terrorist group is connected. For example, a terrorist group can be connected to another group that has one more connection, or it can be connected to a terrorist group that has five other connections. The more terrorist groups a cooperation partner is connected to, the larger is the overall network embeddedness of this terrorist group. I argue that it matters for a terrorist group's stock of resources to how many groups a cooperation partner is connected. A cooperation partner is more relevant if it is connected to many other terrorist groups. This affects the amount of resources, but also the potential diversity of resources a terrorist group can access. Therefore, the degree of embeddedness of a terrorist group positively affects the stock of resources it can use in its attacks. By the logic of my argument made in this chapter, I expect a terrorist group that is more embedded to have a higher operational capability.

Hypothesis 2 (Number of indirect connections): Terrorist attacks that are conducted by terrorist groups that are linked to well-connected terrorist groups are more likely to display a higher operational capability.

6.2.3 Access to structural holes

Finally, I explain the variation in operational capability by relating terrorist groups' access to structural holes to their operational capability. A structural hole is a gap or absence of ties between two terrorist groups (Burt, 1992, 2007; Crossley et al., 2015). Since those two groups are not connected they are unable to pass resources directly between each other. This highlights the powerful position of terrorist

groups that are connecting those otherwise disconnected parts of the network (Burt, 1992; Freeman, 1979). Such terrorist groups establish a bridge to transfer resources. Terrorist groups that are positioned in such a brokerage position own "bridging capital" (Putnam, 2000). They serve as conduits through which resources need to flow. Terrorist groups that are located between two other terrorist groups enjoy the benefits of access to both, which endows them with a great and divers stock of resources.[10] Across disciplines, studies find that actors that bridge structural holes outperform those that are not located in such an advantageous position (Burt, 1992, 2007; McEvily and Zaheer, 1999; Zaheer and Bell, 2005). They can access novel information and diverse resources from remote parts of the network (Burt, 1992). Such actors hear about opportunities and threats, and learn about potential partners for cooperation (Powell and Smith-Doerr, 1994; Uzzi, 1996).

Especially in the context of a global network of terrorist groups, it is important to explore the effect of the immediate neighborhood of a terrorist group. In practice, a terrorist group cannot interact with every other terrorist group, but it faces restrictions and opportunities based on the role it has in its immediate network. A terrorist group that can bridge otherwise disconnected sections of its network can access more resources and conduct attacks with a higher operational capability. In contrast, terrorist groups may have many redundant ties, i.e., multiple ties to the same partner(s). Such ties do not provide fresh resources but increase the transaction costs, which constrains a terrorist group in its ability to explore its resource opportunities. For terrorist groups having access to structural holes is especially desirable as it allows them to access a higher amount or more diverse resources, while minimizing the number of connections it has to other terrorist groups. As elaborated previously, clandestine actors increase their risk of detection by cooperating with others, requiring them to balance the benefits of acquiring resources with the costs of increased visibility. Bridging structural holes can offer them such an opportunity.

Hypothesis 3 (Access to structural holes): Terrorist attacks that are conducted by terrorist groups that bridge structural holes are more likely to display a higher operational capability.

6.3 Organizational structure and operational capability

Terrorist groups need to manage their resources in a way that allows them to use their resources as efficiently as possible. An attack requires the coordination of all resources that are needed for its successful

[10] Burt's concept of structural holes is similar to Granovetters strength of weak ties concept. The important difference is that according to Burt's approach a tie matters to a terrorist group because of who the partnering terrorist groups are NOT connected to (Burt, 1992).

execution. Both human and material resources need to be prepared and moved to the location of the attack. Weapons and other material resources need to be assembled and members of the terrorist group need to be selected to carry out the attack. Those members need to be trained in the use of the weapons and their tactical specifications. They might need to learn how to use a suicide vest, to pilot a plane, or to operate a remote detonator. This requires terrorist groups to have access to such knowledge. It also requires them to retain this knowledge over time, to integrate both explicit and tacit knowledge where necessary, and to have the communication mechanisms in place to transmit information and other resources for successfully coordinated action. The better a terrorist group manages its resources, the better it is expected to perform in its attacks.

Theories of organizational learning and innovation explore these mechanisms in more detail (Horowitz, 2010; Jackson et al., 2005; Jackson, 2001). Goshal and Moran (1996) define the "organizational advantage" that originates in an organization's superior capability to create and transfer knowledge. While those mechanisms are oftentimes tailored towards cognitive resources, I content that this restriction is unnecessarily one-dimensional. Material resources need to be managed as well. Organizational theory claims that a good organizational structure needs to minimize the costs of transaction (Williamson, 1975). In that tradition, a terrorist group is like a conventional firm, in which an authority directs the resources to save costs (Coase, 1937).

Terrorist groups may be able to acquire resources that are available within their environment. However, the assumption that those resources are readily available for the terrorist group to use is a misleading oversimplification of the process of resource allocation. Acquired resources need to be combined with resources already owned by the terrorist group for their efficient use (Cohen and Levinthal, 1990; Kogut and Zander, 1992).[11] As the exploitation of resources is dependent on the individual terrorist group's efforts and ability to exploit resources, some terrorist groups might be better at this than others introducing observable variation in the attack characteristics (Inkpen, 2000).

Previous research summarizes these abilities as 'absorptive capacity' (Cohen and Levinthal, 1990). This capacity describes the ability to evaluate which resources are needed, the willingness to integrate those resources, and the ability to do so. Jackson et al. (2005) apply this approach to terrorist groups. They claim that, given a terrorist group wants to acquire new technologies for reasons discussed above, it needs to match the new technologies with already existing resources. A terrorist group can procure a new type of bombs that can potentially enhance the group's operational capability. However, without the necessary know-how and personnel that can operate the new weapons, they have no effect on the

[11] Terrorist groups can, in principle, acquire readily assembled weapon systems along with the trained personnel to operate these systems. In practice, however, this might be a very rare event due to the availability of the resource and other constraints.

operational capability.[12]

6.3.1 Centralized and decentralized organizational structures

The process of resource retention and absorption requires a prolonged oversight over the operations and tasks of individual divisions. Decentralized terrorist groups lack the ability to track and evaluate the activities of other cells in great detail. This can lead to negative externalities, where cognitive and material resources are lost to parts of the terrorist group. For example, one cell may require training in the use of IEDs. Due to lacking communication and centralized oversight, it is unaware of such knowledge in other cells and needs to either change its tactic or acquire the resources by itself. If the members of the cell, who were proficient in manufacturing the IEDs, become unavailable, the cell loses this tactical opportunity. In centralized terrorist groups, the cognitive and material resources can be retained and deployed to different operational units as required by the central leadership.

Consequently, I argue that centralized terrorist groups are expected to outperform terrorist groups that are decentralized. The managerial processes are more efficient in centralized than in decentralized organizations. A centralized structure superiorly allows to manage existing resources and coordinates between functionally and geographically differentiated parts of the organization to ensure the integration of all relevant segments of the terrorist group to carry out an attack. Resources are less likely to be lost due to miscommunication. IS has exemplified its absorptive capacity over the past years. As a centralized organization it managed to not only keep up with its tactical choices but also to stay innovative to match the changing challenges (Cancian, 2017). Like a firm, it developed new tactics integrating cognitive and material resources efficiently. For example, it managed to use remotely controlled cars in attacks and even to develop airborne drones for intelligence purposes (Hennigan, 2017).

Hypothesis 4 (Centralization): Terrorist attacks that are conducted by terrorist groups that have a centralized organizational structure are more likely to display a higher operational capability.

6.3.2 The moderation effect of organizational structure

I identify the independent effects of the network position and the organizational structure and further argue that the organizational structure influences the effect of the network position as well. The effect that the network position has on the operational capability depends on the organizational structure of the

[12]The successful adoption of new technologies also depends on the technological requirements. As such, a new type of explosive device might be more easily adopted into a terrorist group's repertoir than a nuclear weapon, which would require a much greater skill-set.

terrorist groups that carry out the attack. I expect that those terrorist groups that combine an advantageous network position with an advantageous organizational structure perform better than terrorist groups that are disadvantaged on one dimension.

Hypothesis 5 (Moderation effect): The network position of a terrorist group affects the operational capability more if the group has a centralized organizational structure.

Figure 6.1 provides an overview of the theoretical argument and the related hypotheses, regarding the independent and moderated effect of cooperation patterns and organizational structure on operational capability.

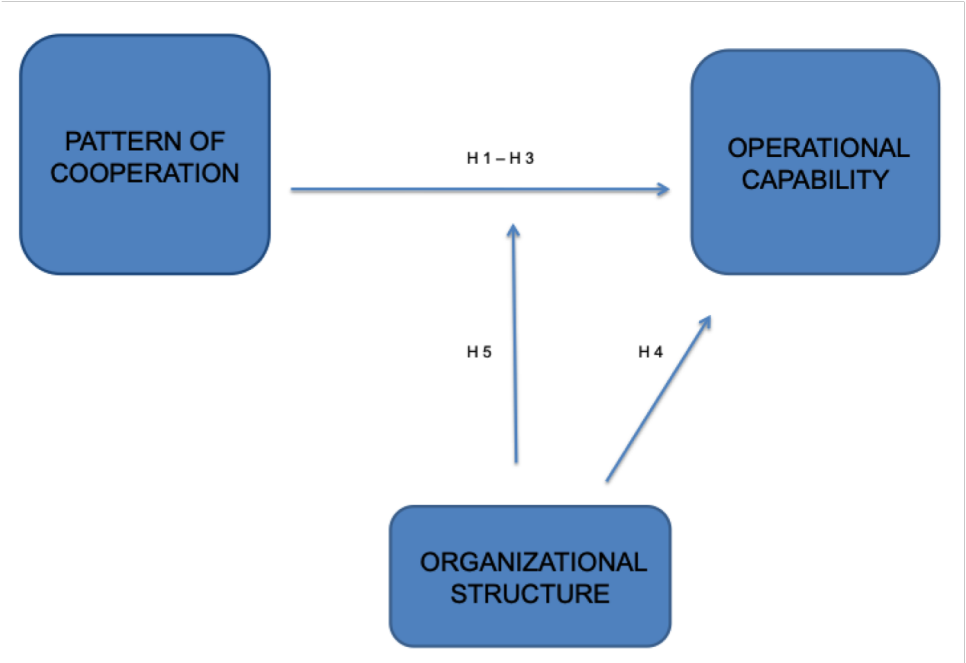

Figure 6.1: Theoretical framework

6.4 Research design

6.4.1 Data sources

The data set creation provided several challenges, which can be grouped into two general issues: first, data limitations inherent to the Global Terrorism Database (GTD), and second, challenges from transforming event data into organizational data. The GTD is the most expansive database on terrorist events worldwide (LaFree and Dugan, 2007; LaFree, Yang and Crenshaw, 2009). It reports terrorist incidents

from 1970 through 2015 and is updated annually capturing a total of about 142,000 attacks. These attacks are performed by a total of 3,240 individual perpetrators. However, the unique identification of these perpetrators provides some challenges, which I discuss in this section.

First, the GTD relies on open source data, thus capturing only terrorist attacks that are publicized. Thus, the events reported are "biased toward (1) the most newsworthy forms of terrorism, and (2) successful attacks that avoided early detection by authorities" (Dugan 2012: 182). Second, different media sources can provide conflicting accounts of terrorist attacks complicating the coding process. Third, Dugan (2012, p. 182) states that the most important limitation of using terrorism event data for generating group information is that many attacks are not attributable to a specific perpetrator. To be included in my sample, each perpetrator needs to be uniquely identified, i.e., the attack reported needs to be attributed to a specified terrorist group. Multiple group names and inconsistent coding exacerbates uniquely identifying the terrorist group. I corrected the final sample of terrorist groups for multiple occurrences of the same group to not artificially inflate the sample (Dugan, 2012, p. 183).[13]

Terrorist groups may come together under a new name (Dugan, 2012, p. 183). These groups can then rely on the inter-personal networks of both individual groups, making them more likely to enter cooperative arrangements. Empirically, the new terrorist group enters the sample as a unique observation in the line of succession of the former individual groups. The orignal groups seize to exist with the formation of the new terrorist group.

Terrorist groups can also fracture. Fractions of specific groups that are the result of splits and splintering and conduct attacks in their own name are considered to be a unique terrorist group (Dugan, 2012, p. 183). While I acknowledge the similarities between the splintering group and the parent organization, I content that it is reasonable to consider them different entities, since the split itself indicates their intent to go their separate ways.

I work with a subset of the GTD that only contains groups that have cooperated at least once in the timeframe under study. This allows me to compare the operational capability of terrorist groups that cooperate at least once. I argue that the social capital of a terrorist group affects what it can manage to do. To have social capital terrorist groups need to have connections to other groups. By this logic, terrorist groups that have no connections to other terrorist groups cannot be part of the network. They are isolate actors, thus being excluded from the sample.[14] In section 6.5.3, I calculate network statistics

[13]The GTD reports attacks that cannont be attributed to any terrorist group in particular (e.g., unknown, other, indivudal, Sikh extremists, or Palestinians). Since I attribute characteristics of the perpetrators to attacks, I need to be able to clearly identify each actor. As it is impossible to correlate these attacks with organizational factors, I exclude these perpetrators from the sample. Further, I recode group names if a group is attributed with multiple group names to make them uniquely identifiable.

[14]Some terrorist groups may never cooperate. Reasons can be, for example, strategic choice or missing opportunity.

as measures of a terrorist group's social capital. Social capital is influenced by the position of a terrorist group within the network. The aim of this chapter is to analyse the influence of varying degrees of social capital. Put simply, I compare terrorist groups that cooperate a lot with those that cooperate less. While the GTD is updated annually the control variables limit the time frame to the years 1970 through 2010. The final sample includes 30,635 terrorist attacks carried out by a total of 205 terrorist groups.

Seconde, the GTD data are event data capturing different qualities of terrorist attacks. Terrorist groups are listed as perpetrators attached to individual attacks. When interested in organizational characteristics these datasets need transformation. Creating an organizational dataset from an event database is prone to various difficulties that need to be addressed (Young and Dugan, 2014, p. 8). I highlight those challenges when describing the operationalization of the respective variables in the following sections.

6.4.2 Dependent variable

The dependent variable is the operational capability displayed in an attack.[15] This chapter introduces a novel measure, aiming to assess the effect of resources at a terrorist group's disposal as directly as possible. I use the sophistication of weapons as a proxy, since it offers a more immediate way to measure the operational capability of a terrorist group compared to other measures, such as the frequency or lethality of attacks (Asal and Rethemeyer, 2008; Horowitz and Potter, 2014). Previous categorizations of weapons are not suitable for this analysis for several reasons. A direct measurement of the monetary value of the weapons is not possible due to the extreme fluctuation in prices over time and space (Small Arms Survey, 2007). Other established categorizations of weapons, such as the United Nations differentiation between small arms and light weapons, are too broad for this analytical purpose, as terrorist attacks rarely feature weapons such as rocket systems.

I categorize the sophistication of the weapons used in a terrorist attack as *high* versus *low*. It is defined by the accessibility of the weapons and the simplicity to operate them. The value *low* is assigned either to cases where only manpower was used to conduct the attack or where manpower was combined with an ordinary tool that can be accessed legally on an everyday basis. Weapons in this category are straightforward in their handling and users do only need basic instructions. For example, I assign the value *low* to an attack where fire accelerants or vehicles were used. The sophistication of the weapon is also classified as *low* if manpower and an actual weapon are used, which is restricted in its accessibility due to its semi-legal or illegal nature. Using those weapons is still fairly easy, requiring only basic training. Events in which terrorist groups use handguns, for example, fall into this category. The value *high* is assigned to weapons that require extensive training to be used successfully. Additionally, access

[15] I do not measure the capability on the group level, but focus on the observable characteristics of a terrorist attack.

to those weapons is defined broadly as semi-legal or illegal due to the fact that the legal status of a weapon depends on the local law. An example is the use of semi-automatic weapons or biological agents in a terrorist attack. Figure 6.2 shows the distribution of the dependent variable.

The unit of analysis it the terrorist attack. The GTD reports up to four types and sub-types of weapons that were used in each terrorist attack. I calculate the highest level of sophistication of weapon for each attack to retrieve the dependent variable on the attack level. I code the sophistication of a weapon based on the reported weapon type or sub-type. Only if the type of weapon is clearly identifiable I assign the respective value. For attacks where the GTD reports the weapon as "unknown" or "other", I cannot code the sophistication of weapon. Thus, the variable is missing for those attacks. The detailed coding procedure is provided in the appendix A.5.

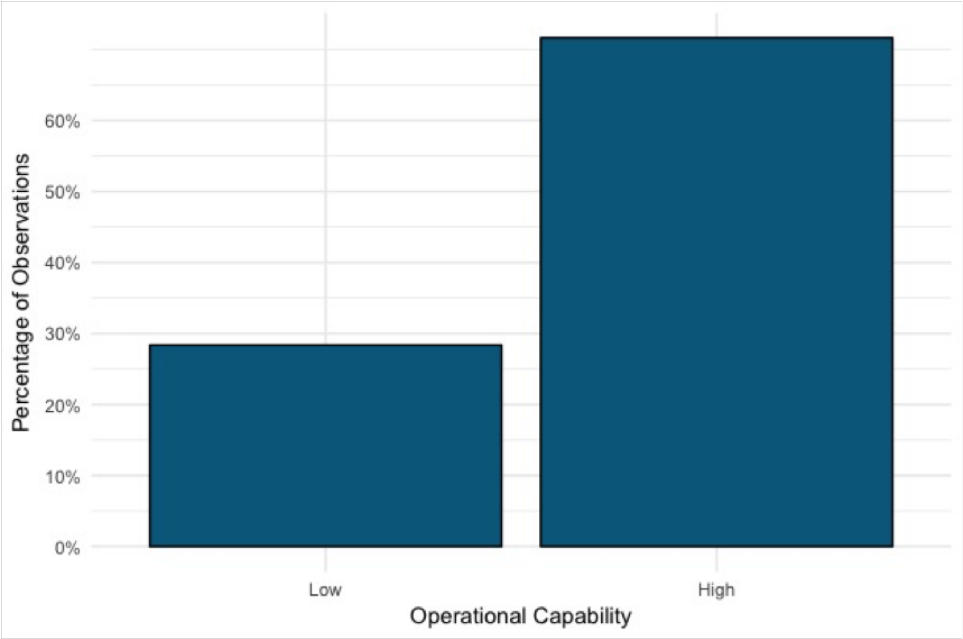

Figure 6.2: Distribution of the operational capability

6.4.3 Independent variables

The independent variables account for the social capital of a terrorist group determined by the position of a terrorist group in the overall network of terrorist groups. I use measures of the network analysis as covariates in the regression analysis. I include the number of direct connections of terrorist groups (degree centrality), the number of indirect connections (eigenvector centrality), and their access to structural holes (constraint). Those network statistics capture the power and control over individual terrorist groups' resources. Terrorist groups can be located in an advantageous position if they have many connections to other terrorist groups, if they are connected to terrorist groups that are themselves well

connected, or if they bridge two or more clusters of terrorist groups that would be otherwise disconnected. These measures provide information on the group level. I aggregate this information to the attack level, as multiple groups are active in the same attacks based on the research design. While I sum up the direct connection to aggregate degree centrality, I aggregate eigenvector centrality and constraint by taking the mean over all groups committing an attack together.

I calculate the values of the independent variables using information provided by the GTD. The GTD reports up to three names of perpetrating groups for each terrorist attack. The order of the perpetrators does not convey any additional meaning, but that they are all reported to have carried out the attack by the media.[16]

To calculate those centrality measures, I create an adjacency matrix representing the relations of all groups that are part of at least one cooperation dyad; i.e., that is part of a joint attack at least once. The value in the cell is coded 1 if a cooperative tie between two terrorist groups exists and 0 otherwise. This results in a square matrix that is symmetric and undirected, as the perpetrators' order in the GTD holds no meaning. Furthermore, due to limited information, it is impossible to assess the distribution of work between the two terrorist groups. We only know that there was operational cooperation. Most importantly, undirected measures also reflect my understanding of resources being mutually beneficial for both terrorist groups.

Figure 6.3 provides a visualization of the network studied. The nodes represent all terrorist groups in the sample; the ties represent cooperative relationships during attacks aggregated over the entire time frame of 1970 through 2010.[17] Attaching the frequency of cooperation as edge attributes allows me to plot the entire network of terrorist groups with the thickness of the ties illustrating the number of interactions between two groups. The entire network is comprised of 205 unique terrorist groups that are connected by a total of 632 ties.

The graph illustrates an uneven distribution of connections. Some terrorist groups are well connected with other terrorist groups, while others are only peripheral actors with few connections. Theses differences are captured by the independent variables. Prior to the calculation of the network variables, the graphical visualization provides a first intuition about the flow of resources. The inequality in network connections implies that the network is not very well integrated hampering the flow of resources. The heterogeneity in terms of access to resources is high in this network, implying that some terrorist groups have substantially better access to network resources than others.

[16]While I acknowledge that media reports can report diverging perpetrators due to the lack of consistent information, the co-mentioning of terrorist groups responsible for the same attack, provides one of the best proxies to date.

[17]This plot provides an overview over all instances of cooperation between 1970 and 2010. Not all terrorist groups are able to cooperate with any other group displayed in this overview since it shows an aggregation over space and time.

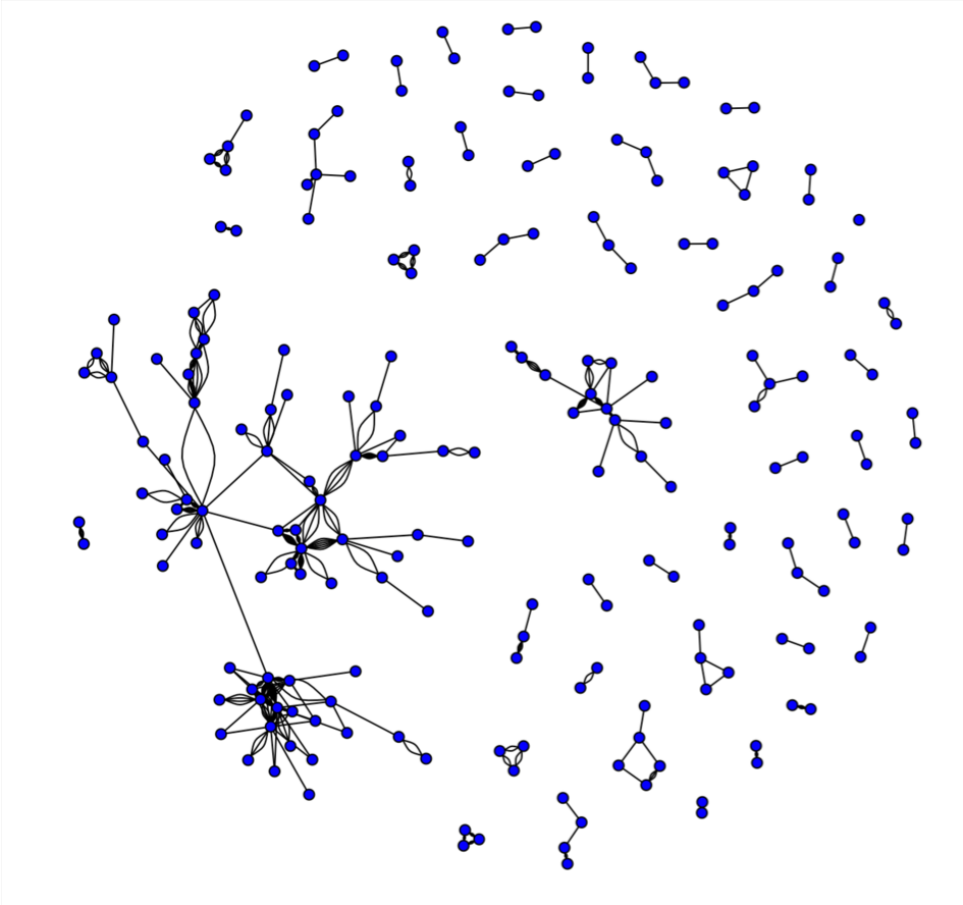

Figure 6.3: Overview of cooperation networks of terrorist groups

This is further reflected in a low density (0.3) of the network. The density score indicates the proportion of all possible ties that are present (Crossley et al., 2015).[18] It captures the possibility and speed of resources diffusing within the network (Hanneman and Riddle, 2011, p. 342). Therefore, it provides first intuition about how possible it is for resources to be moved through the network.

While the overall network structure provides preliminary intuition about the flow and accessibility of resources, it is important to focus on local structures and positional attributes to explain why some terrorist groups display higher levels of operational capability than others. The positional attributes relate to the accessibility of resources. To account for that, I calculate a terrorist group's degree and eigenvector centrality as well as constraint. These variables measure access to resources in terms of quantity and diversity as well as speed. According to my theory, terrorist groups that are located in a favorable position within the network have superior access to social capital gained through the exchange of resources that can enhance their operational capability. While degree is a count of direct connections, a terrorist group's eigenvector centrality allows me to study the effect of indirect connections via

[18] Thus, it divides all present ties by all possible ties.

well-connected terrorist groups (Bonacich, 1987). The terrorist group with the highest degree value is FARC with a total of 66 direct connections to other terrorist groups. I argue that a terrorist group not only benefits from its direct connections but also from indirect connections. The eigenvector centrality accounts for the position of the partners within the cooperation network. This measure captures how connected the exchange partners are themselves. A higher eigenvector centrality score corresponds with a higher number of those indirect partners. The group with the highest eigenvector centrality is also FARC.

Holland and Leinhardt (1976) propose that the closer inspection of local structures improves the understanding of social networks. Social networks tend to cluster together in dense groups (Holland and Leinhardt, 1970; Snijders et al., 2006; Watts and Strogatz, 1998). The goal of this chapter is to link the operational capability to different opportunities to access resources from other terorist groups. The network studied in this chapter is fragmented meaning that not all terrorist groups can reach any other terrorist group.[19] Thus, measures that relate the individual terrorist group not to the entire network but to its immediate neighborhood are useful. I measure a terrorist group's access to structural holes with constraint. Network constraint measures a terrorist group's lack of access to structural holes (Burt, 1992). As elaborated in the theory section, a structural hole presents the absence of ties between two terrorist groups. Low measures of constraint are associated with greater access to structural holes. Put simply: Terrorist groups that have low values of constraint have greater "bridging capital", i.e., they are located between terrorist groups that would otherwise be disconnected. Such a terrorist group can benefit from its location in the network. Terrorist groups with high measures of constraint have redundant ties. Those ties provide little novel resources. Regarding my theoretical argument, smaller constraint is associated with more operational capability. The terrorist group with the highest constraint is Hizb-I-Islami measuring a constraint value of 1.33, whereas the terrorist group that is least constrained is Lashkar-e-Jhangvi with a value of 0.23.

These independent variables account for the social capital of a terrorist group determined by its position in the network. I use network analysis measures as covariates in the regression analysis. In my regression models, I include the number of direct connections of terrorist groups (degree centrality), the number of indirect connections (eigenvector centrality), and their access to structural holes (constraint).

I argue that the effect of social capital gained through cooperation on the operational capability depends on the organizational structure of the terrorist group. I measure the organizational structure by its degree of centralization. I include the dummy variable *central*, which is 1 if all groups that are active

[19] Also, terrorist groups are not necessarily temporarily or spacially co-present in the network analyzed in this chapter.

in the attack have a centralized organizational structure and 0 otherwise.[20] For more detail on the coding procedure of the organizational structure of terrorist groups see chapter 4.

6.4.4 Control variables

I include several control variables to capture alternative explanations of variation in a terrorist group's operational capability. The operational capability of a terrorist group is promoted and constrained by environmental and organizational factors. As with the other independent variables, I link information available on the group level to observations on the attack level. I aggregate by taking the mean value of the variables for all groups that commit an attack together.[21] Previous studies have utilized organizational and country level data to study the behavior of terrorist groups (Asal and Rethemeyer, 2008; Blomberg, Gaibulloev and Sandler, 2011; Libicki and Jones, 2008). Young and Dugan (2014) compile one of the most extensive and comprehensive datasets on terrorist organizations as well as organizational and country level variables. I rely on their data to control for terrorist group‘s organizational and environmental characteristics.

Environmental variables

I control for the number of other terrorist groups that are active in the same country and in the same year as the focal terrorist group. Several studies attribute features of attacks to the competition and outbidding between terrorist groups (Conrad and Greene, 2015; Nemeth, 2014; Young and Dugan, 2014). More terrorist groups operating in the same country can have a positive effect on a terrorist group's operational capability. In an attempt to showcase their capabilities, terrorist groups need to invest resources in their attacks. Only by appearing as the "fittest" terrorist group in the country it can distinguish itself from other groups and attract recruits (Young and Dugan, 2014). I also control for state capacity. The operational capability is directly linked to a state's ability to counter terrorism and suppress a terrorist group's activities. I include logged GDP, which is commonly used as a proxy for the level of development in a country and the state's capabilities (Fearon and Laitin, 2003; Hendrix, 2010). Following Young and Dugan (2014, p. 9), I measure GDP in hundreds of thousands of dollars to render the coefficient easier to interpret.[22] I also account for the logged population size, as it might positively affect the capabilities

[20] The variable is zero if either all terrorist groups active in the attack have a decentralized organizational structure or if some groups are decentralized and others are centrally organized. This provides a conservative measure of organizational structure.

[21] The same logic appies for variables measured on the country level. The logged GDP, for example, is taken from each terrorist group's primary country and then averaged over all terrorist groups committing an attack together.

[22] Some studies include the state material capabilities index (CINC) from the Correlates of War project to control for a state‘s military capabilities (Greig and Enterline, 2017; Singer, Bremer and Stuckey, 1972). While GDP is a more general proxy for what a state can manage to do, the CINC rather captures the military capabilities of a state. I do not include this measure in my models as it introduces too many missing observations.

of a state (Blomberg, Gaibulloev and Sandler, 2011). As a higher population size is related to smaller operational capabilities of the terrorist group. Next, I control for militarized conflict in the country. Using data from the Uppsala Conflict Data Program, I code a dichotomous variable that is 1 for a conflict in a terrorist group's primary country, and 0 otherwise (Allansson, Melander and Themnér, 2017; Gleditsch et al., 2002). Controlling for militarized conflict in a country also accounts for the definitional and empirical ambiguity of terrorist groups. Oftentimes, the difference between a terrorist group and a guerilla group is unclear.[23] The definition of terrorism and terrorist groups in this dissertation is strategic, highlighting that various actors can employ terrorism as a tactical choice. Finally, I include region dummies created from the GTD. They capture region-specific effects. I code five regions - Asia, America, Europe, Sub-Saharan Africa, and one combining countries from the Middle East, Central Asia, and North Africa. The reference category is America.

Organizational variables

Organizational variables can also affect a terrorist group's operational capability. I control for a terrorist group's age to account for the possibility that older groups might be more experienced in conducting attacks as well as acquiring and handling more sophisticated weaponry (Jackson, 2001). Older groups are expected to have a larger operational capability. I calculate a terrorist group's age based on the number of years it has been included in the GTD. While this is the best proxy to date and has been used in studies before (Dugan, 2012; Young and Dugan, 2014), it is also biased. There is no systematic information available regarding if and how long a terrorist group has been active before the GTD starts reporting attacks in 1970. It is also possible that a terrorist group has been active before but has not conducted reported attacks. This might be attributed to the reporting bias in media sources or the transformation of an organization, for example from a rebel group to a group that uses terrorism. This bias can potentially affect the results for terrorist groups conducting attacks around the starting year of 1970. The measure should be more accurate for terrorist groups, whose entire life span is well within the timeframe of the analysis. Table 6.1 provides descriptive statistics on all independent and control variables that are part of the analysis.

[23] See chapter 2 for a detailed review of the debate.

Table 6.1: Descriptive statistics

Number of attacks				**13554**
Numerical variables				
Variable	**Mean**	**Variance**	**Max**	**Min**
Degree	14.06	21.46	158	1
Eigenvector	0.11	0.30	1	0
Constraint	0.79	0.21	1.33	0.23
logged GDP	3.84	0.81	6.08	0.82
logged Population size	9.89	1.22	13.96	6.87
Age	11.59	7.82	40	0
Groups per country	6.72	7.07	76	1
Factor variables				
Variable	**Yes (1)**	**No (0)**	**In percent**	
Operational capability	10397	4116	71.6%	
Centralized structure	11827	2686	81.5%	
Conflict	12168	1801	12.4%	
America	6879	7634	47.4%	
Asia	3824	10689	26.3%	
Africa	251	14262	1.7%	
Europe	1319	13194	9.1%	
MeCaNa	2240	12273	15.4%	

6.4.5 Method

Figure 6.4 displayes the empirical logic illustrating the variables used to assess the theoretical framework.

This chapter combines statistical analysis with social network analysis. Using both methods in conjunction allows me to test innovative hypotheses, studying the effect inter-organizational relationship patterns on differences in performance of individual organizations. This chapter aims to identify a moderation effect of the organizational structure on the direct effect of cooperation including the network position on the operational capability of a terrorist group. Thus, this analysis accounts for environmental and organizational variables and assesses their joint effect on the performance of terrorist groups as well. Figure 6.4 summarizes the empirical strategy used in order to match the theoretical framework.

As the dependent variable is a binary measure for the sophistication of the weapon used in an attack, I specify logistic regression models to test my hypotheses. I first test the effect of social capital and the organizational structure of terrorist groups separately before I test whether the effect of social capital on operational capability is dependent on the organizational structure. In models 2 through 4 I assess the impact of a terrorist group's social network on the operational capability displayed in a terrorist group's attack. In my second model, I test the effect of a terrorist group's direct connections and then move on to assess a group's indirect connections. To model a terrorist groups embeddedness in a network of

terrorist groups, I focus on the terrorist group's eigenvector centrality. The fourth model accounts for a terrorist group's access to structural holes measured by the constraint of a terrorist group. The fifth model assesses the effect of the organizational structure on the operational capability observable in an attack. In separate models, I test the moderation of the previous effects by the organizational structure reported in table 6.3. I calculate predicted probabilities to evaluate the substantive effects.

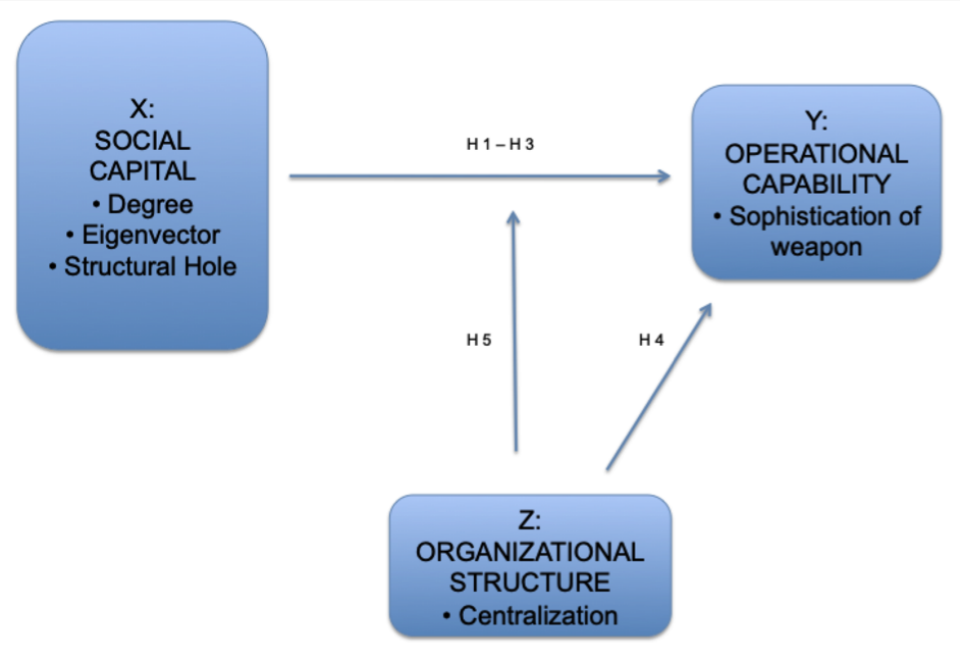

Figure 6.4: Empirical strategy

6.5 Results

The goal of this analysis is to assess the correlation between a terrorist group's social capital and its operational capability displayed in its attacks. I find no support for hypothesis 1 postulating a correlation between the direct network connections of a terrorist group and its operational capability. I find statistically significant effects for the other main covariates. Tables 6.2 and 6.3 provide an overview of the regression results.

I find support for hypothesis 2 relating the indirect connections of a terrorist group to the operational capability displayed in an attack. The odds of attacks conducted by terrorist groups with many indirect connections displaying high operational capability are 1.42 times higher compared to other attacks. The effect size of a terrorist group's eigenvector centrality is small. The predicted probability of an attack displaying a high operational capability increases by roughly 6 percentage points from about 77% to 83% when terrorist groups have many indirect connections (see figure 6.5). My findings support

Table 6.2: Regression results of independent effects

	Dependent variable:				
	OperationalCapability				
	(1)	(2)	(3)	(4)	(5)
Degree		−0.001			
		(0.001)			
Eigenvector			0.348***		
			(0.085)		
Structural Hole				0.644***	
				(0.117)	
Centralized					0.371***
					(0.053)
GDP (logged)	−0.162***	−0.162***	−0.117**	−0.132**	−0.104*
	(0.054)	(0.053)	(0.055)	(0.053)	(0.054)
Population (logged)	−0.481***	−0.477***	−0.503***	−0.492***	−0.455***
	(0.024)	(0.024)	(0.025)	(0.024)	(0.025)
Age	−0.007**	−0.006*	−0.013***	−0.006**	−0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Conflict	0.720***	0.734***	0.705***	0.781***	0.713***
	(0.100)	(0.100)	(0.100)	(0.099)	(0.100)
Interaction	0.024***	0.025***	0.022***	0.028***	0.023***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Asia	0.407***	0.379***	0.605***	0.515***	0.509***
	(0.085)	(0.087)	(0.098)	(0.086)	(0.087)
Europe	−1.394***	−1.410***	−1.376***	−1.525***	−1.454***
	(0.117)	(0.117)	(0.117)	(0.118)	(0.118)
Africa	−1.397***	−1.407***	−1.265***	−1.297***	−1.252***
	(0.180)	(0.179)	(0.183)	(0.181)	(0.180)
MeCaNa	0.395***	0.380***	0.465***	0.348***	0.368***
	(0.069)	(0.070)	(0.071)	(0.070)	(0.069)
Constant	5.774***	5.733***	5.820***	5.177***	5.024***
	(0.308)	(0.309)	(0.308)	(0.324)	(0.328)
Observations	13,554	13,554	13,554	13,554	13,554
Log Likelihood	−7,187.532	−7,186.526	−7,179.033	−7,172.403	−7,163.296
Akaike Inf. Crit.	14,395.060	14,395.050	14,380.070	14,366.810	14,348.590
Note:					*p<0.1; **p<0.05; ***p<0.01

Table 6.3: Regression results of moderation effect

	Dependent variable:		
	OperationalCapability		
	(1)	(2)	(3)
Degree	−0.001		
	(0.003)		
Eigenvector		6.721***	
		(0.874)	
StructuralHole			0.046
			(0.214)
Centralized	0.398***	0.533***	−0.387*
	(0.066)	(0.057)	(0.202)
GDP_log	−0.110*	−0.017	−0.022
	(0.056)	(0.056)	(0.054)
Population_log	−0.447***	−0.470***	−0.453***
	(0.025)	(0.025)	(0.025)
Age	−0.007**	−0.014***	−0.008**
	(0.003)	(0.003)	(0.003)
Conflict	0.729***	0.674***	0.769***
	(0.101)	(0.101)	(0.099)
Interaction	0.024***	0.018***	0.028***
	(0.003)	(0.003)	(0.003)
Asia	0.466***	0.822***	0.712***
	(0.090)	(0.102)	(0.090)
Europe	−1.474***	−1.452***	−1.709***
	(0.119)	(0.119)	(0.122)
Africa	−1.273***	−0.966***	−0.968***
	(0.182)	(0.185)	(0.184)
MeCaNa	0.348***	0.482***	0.271***
	(0.070)	(0.071)	(0.071)
Degree:Centralized	−0.002		
	(0.003)		
Eigenvector:Centralized		−6.448***	
		(0.868)	
StructuralHole:Centralized			1.069***
			(0.255)
Constant	4.944***	4.671***	4.490***
	(0.330)	(0.333)	(0.358)
Observations	13,554	13,554	13,554
Log Likelihood	−7,161.261	−7,121.510	−7,132.021
Akaike Inf. Crit.	14,348.520	14,269.020	14,290.040
Note:			*p<0.1; **p<0.05; ***p<0.01

the importance of indirect connections regarding a terrorist group's operational capability. A terrorist group that interacts with well-connected terrorist groups can reap the benefits of those ties. My findings complement the analysis by Horowitz and Potter (2014), who find that terrorist groups benefit more from being connected to other terrorist groups who are centrally embedded themselves. It contradicts Phillips (2013), whose results show that those indirect connections are not as important as direct connections for explaining the longevity of terrorist groups.

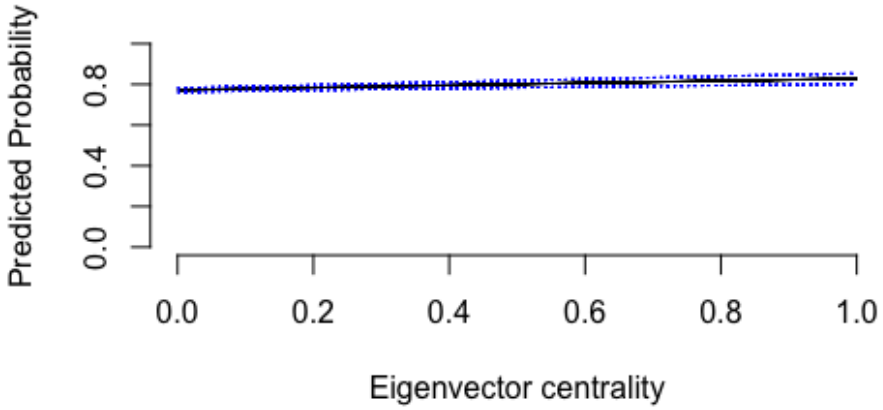

Figure 6.5: Predicted probability of indirect connections

I also test whether the access to structural holes affects the operational capability of a terrorist group. As elaborated above, terrorist groups that have access to structural holes are in a beneficial network position, as they bridge the gap between two otherwise disconnected groups. In the context of my argument, this means that terrorist groups in such a position can access resources from both actors. The access to structural holes is evaluated with the measure of constraint. More precisely, low measures of constraint indicate that a terrorist group has access to structural holes and can benefit from diverse resources. In contrast, a terrorist group with high measures of constraint has multiple ties to the same partner(s). It is constrained by the costs of cooperation while getting access to few novel resources. In order to support the hypothesis that terrorist groups that access structural holes display a higher operational capability in their attacks, the relationship needs to be negative. Lower values in constraint correspond to a higher probability of displaying high operational capability. To interpret the substantive effect, I calculate predicted probabilities (see figure 6.6). The predicted probability of an attack displaying high operational capability increases by about 12 percentage points from about 71% to 83% when constraint varies from the minimum to the maximum value. Thus, hypothesis 3 cannot be supported.

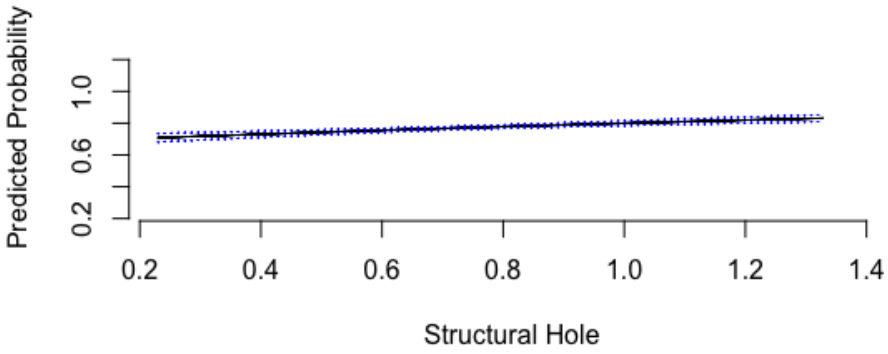

Figure 6.6: Predicted probability of structural holes

Hypothesis 4 is supported. The odds for attacks displaying a high operational capability are 1.45 times higher for attacks conducted by terrorist groups that all have a centralized organizational structure compared to attacks that are conducted by terrorist groups of which at least one is decentralized. Substantively, the predicted probability increases by about 7 percentage points from about 72% to 79% when all terrorist groups are centralized.

Hypothesis 5 is only partly supported by the evidence. I find no statistical significant effect for the interaction of organizational structure and the amount of direct connections to other terrorist groups. I find statistically significant moderation effects for the amount of indirect connections of terrorist groups as well as its access to structural holes.

All else equal, a one-unit change in eigenvector centrality increases the likelihood of attacks displaying a high operational capability by 6.72 percentage points. In cases where all terrorist groups have a centralized organizational structure, the likelihood of attacks displaying a high operational capability increases by 0.53 percentage points.[24] The interaction term is statistically significant, indicating that the slopes for operational capability on eigenvector are significantly different for each level of the moderation variable. In other words, the effect of eigenvector centrality decreases by 6.45 percentage points if all terrorist groups that carry out the attack have adopted a centralized organizational structure. This finding contradicts the hypothesis stating that terrorist groups that are well embedded within the network benefit even more if they are centrally structured.

The substantive effects have to be interpreted tentatively. The results are biased by an unequal distribution of observations. Concerning the eigenvector, almost all observations cluster in the lowest and highest values of eigenvector centrality. Additionally, there are no attacks that are conducted by

[24] I acknowledge the small magnitude of the effect. The reasons for this finding are discussed towards the end of this section.

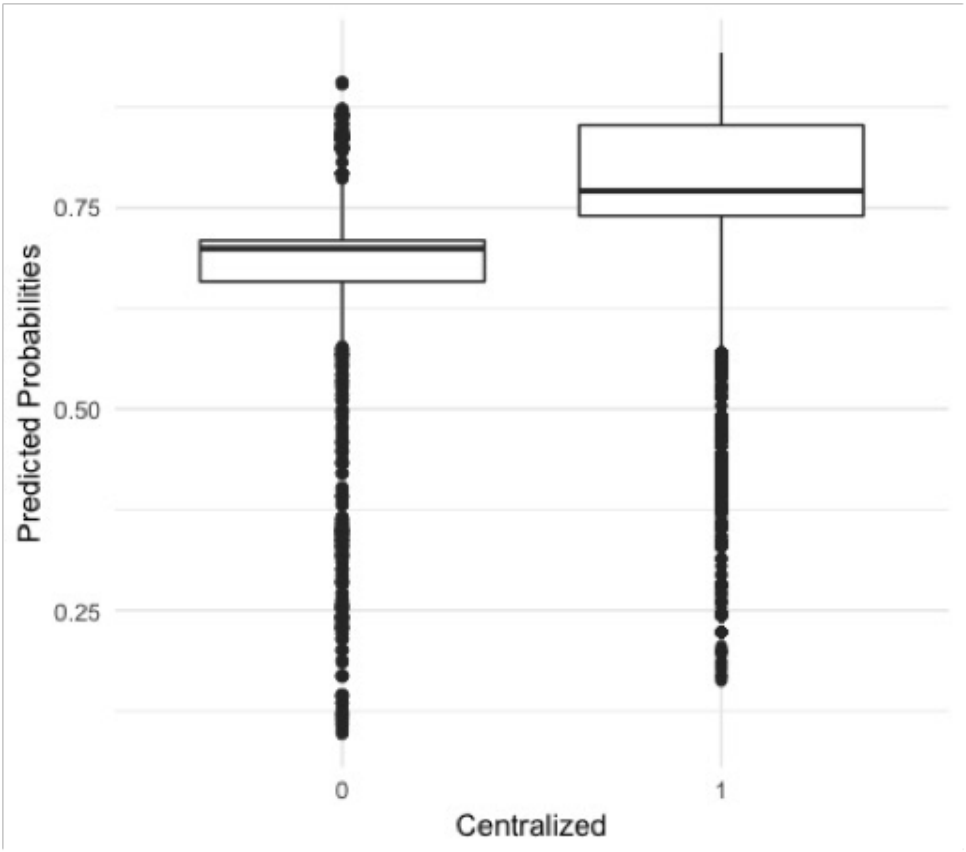

Figure 6.7: Predicted probability of centralized structure

terrorist groups that are highly embedded and are not centralized.

When assessing a terrorist group's constraint, the interaction effect is also statistically significant, suggesting that the effect of a terrorist group's access to structural holes on the operational capability visible in an attack is different for attacks that are carried out only by centralized groups. The effect of constraint increases by 1.07 percentage points for those attacks carried out by centralized groups. This contradicts the hypothesized effect. I proposed that terrorist groups that are centralized are better at efficiently managing resources. Being mindful of the small effect size, careful interpretation suggests that those groups that have access to structural roles are not only in a more beneficial network position but can increase this effect in case of being structured centrally.[25] In testing hypothesis 3, I find that attacks carried out by terrorist groups that are more constrained by their immediate neighborhood and not in a position to bridge structural holes, are more likely to show high operational capability. While the original hypothesis concerning the access to structural holes cannot be supported, the moderation of such access by the organizational structure is supported by the results.

[25] According to my theoretical argument, I expect low constraint, i.e., high access to structural holes, to relate to attacks showing high operational capability and high constraint, i.e., low access to structural holes, to relate to low operational capability displayed in attacks.

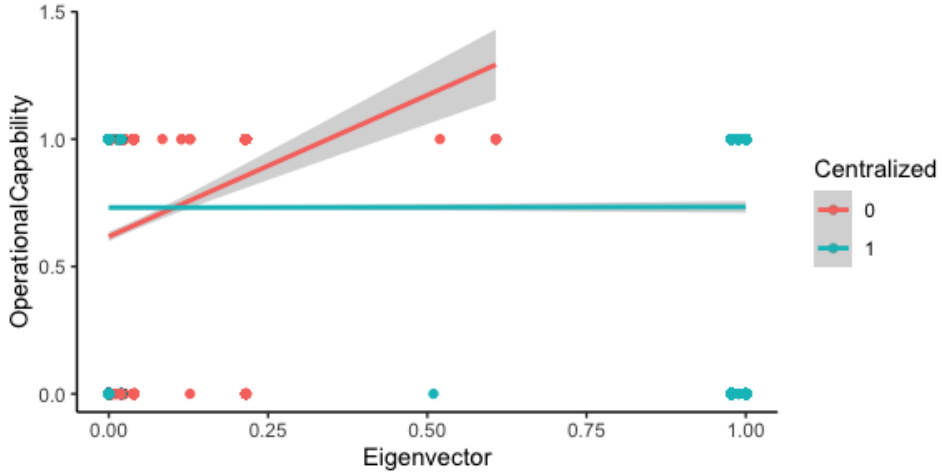

Figure 6.8: Predicted probability of eigenvector on structure

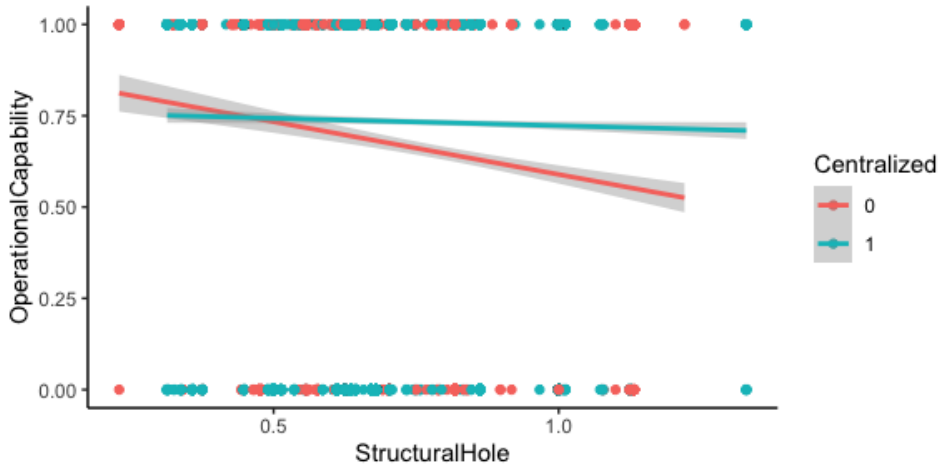

Figure 6.9: Predicted probability of structural holes on structure

To summarize, I find that the position of a terrorist group within its social network matters just as much as its organizational structure. I find no statistically significant effect for the amount of direct connections to other terrorist groups (H 1) affecting the operational capability displayed in a terrorist groups' attacks. I do find statistically significant effects for the amount of indirect connections of a terrorist group (H 2) affecting the operational capability displayed in a terrorist groups' attacks. The results indicate a relation between terrorist groups' access to structural holes within the network and the operational capability shown in their attacks (H 3). The effect is counter the hypothesized direction. The relation between terrorist groups being centrally structured and the operational capability in attacks is also sustained by the results (H 4). I find evidence for two interaction effects (H 5): First, between the amount of indirect connections of a terrorist group and its organizational structure and second, between a terrorist group's access to structural holes and its organizational structure. For both interactions the

direction of the effect is counter to the expected one.

The effect sizes are small across all models. Judging by the Akaike Information Criterion (AIC) the explanatory power of the covariates add little explanatory power to the model including only the environmental and organizational control variables. The best explanatory power has the model evaluating the interaction between the organizational structure of the terrorist groups carrying out the attack and the indirect connections of those groups. This highlights two points regarding the capability of terrorist groups: it matters to whom a terrorist group is connected and combining environmental variables with group-internal dynamics is paramount.

6.6 Conclusion

The goal of this chapter was to explore the mechanisms of how variation in operational capability of terrorist groups can be explained by social capital. My results show that the social capital of a terrorist group influences the operational capability displayed in the group's attacks. I use metrics of social network analysis to operationalize a terrorist group's access to social capital that is generated within the cooperation network. I find that it pays to be cooperating with a terrorist group that itself cooperates extensively. Terrorist groups benefit from cooperating with another terrorist group that cooperates itself as they can potentially access more and more diverse resources. My findings also indicate that the organizational sturcture of a terrorist group moderates the effect of its social capital. I argued that the managerial capacities that come with a centralized structure allow for more efficient resource allocation, which should be reflected in what a terrorist group manages to do. The results support my argument that terrorist groups are connected to other terrorist groups to access resources and that their resource management is subject to internal constraints of their organizational structure.

The explanatory power of the models is poor. Uneven distribution of observations across the variables is one factor resulting in small effect sizes. Future research would benefit from improving data collection, but also better operationalization. A lot of information is lost when aggregate variables. Projects could focus on a dynamic approach allowing for time-sensitive variance and network evolution over time. Other network predictors might be helpful to further dissect the effect of a terrorist group's position within the network on its capabilities. Being part of a tight-knit clique of terrorist groups might enable the members of this clique to do things they would not be able to implement otherwise. The results do not support the hypothesis that those terrorist groups that are in a position to bridge two otherwise unconnected groups in their immediate neighborhood perform with a higher operational capability. However, terrorist groups that bridge two otherwise unconnected groups in the entire network might

outperform others. This is a promising avenue for future research.

The network used in this chapter relies on two terrorist groups being responsible for the same attack. Other operationalizations of cooperation are possible that change the make up of the network and, hence, the predictors.

Cooperation and resource exchange between terrorist groups does not only happen when they conduct attacks together. In fact, it is to be expected that many instances of cooperation happen outside of attacks. The following example can illustrate that predicament. In the early 2000s, FARC reached their tactical limits in their struggle against the Colombian government. After peace negotiations failed and the Colombian forces took control over the previously demilitarized zone, FARC adapted their strategy. It increasingly changed their tactics to terrorist attacks in Colombian cities (Hodgson, McDonald and Beaumont, 2001). Since this new strategy exceeded their internal capacities FARC leadership turned to the Provisional Irish Republican Army (PIRA) for new weapons and technologies (Cragin et al., 2007). In August 2001 three members of PIRA were arrested at Bogota airport while traveling with false passports.[26] They were on their way back from FARC controlled Despeje, where they allegedly trained FARC members in the use of various explosive devices (Ward and Hackett, 2003). This exchange enabled FARC to perform attacks with more sophisticated weapons resulting in higher intensity in terms of lethality and frequency.[27] This case illustrates the rationale of cooperation between terrorist groups.

In the analysis, I also need to aggregate over all instances of cooperation losing the time-variance in the data as well. Until better data are generated, I need to follow in the traditions of other authors researching cooperation between terrorist groups in a quantitative design (Asal, Ackerman and Rethemeyer, 2012; Asal and Rethemeyer, 2008; Horowitz and Potter, 2014; Horowitz, 2010; Karmon, 2005; Phillips, 2013) being aware of the caveats and biases this introduces. This approach neglects to acknowledge the dynamic character of cooperative relationships. It collapses instances of cooperation to the group level, disregarding timelines and developments of relationships. Borgatti and Lopez-Kidwell (2011, p. 45) summarize this challenge stating that "the event network we see is not the potential structure defined by underlying relations, but an actualized instance that could change at any time and therefore does not tell us what other paths might have been possible." Time-sensitive analysis could also help to evaluate whether previous cooperation affects the likelihood of cooperating again in the future. Using social network analysis to generate predictors conceptualizes the reality of terrorist groups as being connected to other actors in their environment. In order to accumulate the necessary resources for an attack they might rely on other factors, but their social capital and their internal managerial capacities play an

[26] The so-called Colombian Three: Niall Connolly, Martin McCauley, and James Monaghan.

[27] More than 400 members of the Colombian security forces were killed in an 18-month period (Cragin et al., 2007).

important role as well.

Chapter 7

Conclusion

Terrorist groups cannot live on idealism alone (Adams, 1986). To carry out operations and sustain their organization they need resources. This dissertation focused on the process of a terrorist group's resource generation process. It explored the questions of how terrorist groups can acquire resources from their external environment and how resources are allocated within a terrorist group to be used in an attack.

I developed an argument that highlights the interaction of factors that are external and factors that are internal to a terrorist group. I provided evidence for such an interaction in three empirical chapters. In chapter 4, I focused on the interplay between external environmental and internal organizational determinants affecting the organizational structure of a terrorist group. I found that in an environment where the state has the ability and the willingness to repress, terrorist groups are less likely to adopt a centralized structure. This finding is in line with previous research attributing a higher degree of resilience to a decentralized structure, arguing that it is less likely to receive a fatal shock and also better equipped to recuperate from disruption (Eilstrup-Sangiovanni and Jones, 2008). The findings also highlight that it is important to pay attention to the function a terrorist group needs to carry out within a country. Specific functions may require a specific structural design. During the Cold War, terrorist groups were often utilized by a state as an illicit force, requiring the terrorist group to adopt a centralized organization. I also claimed that terrorist groups may need to fulfill certain functions concerning their constituency. I provided evidence suggesting that a terrorist group, which needs to coordinate between multiple ethnic fractions is more likely to be centralized. I also tested the effect of ideology on the organizational structure. Ideology is a publicly observable proxy for the goals of a terrorist group. The evidence suggests that terrorist groups pursuing a maximalist ideology are less likely to be centralized. Ideology has often been studied as a determinant of certain terrorist group behavior.[1] However, it has

[1]The effect of ideology has been studied, for example, concerning its effect on cooperation partner selection (Moghadam, 2017), its effect on getting involved in organized crime (Hutchinson and O'Malley, 2007), or the intensity of terrorist attacks

never been investigated in correlation with the structural set-up of a terrorist group.

In chapter 5, I explored both environmental and organizational determinants that drive a terrorist group's involvement in organized crime. In contrast to the other empirical chapters, this analysis utilized an inductive machine learning approach. The evidence suggests that organizational factors out-perform environmental ones, with group size and ideology being the most influential variables for leveraging accurate predictions. In chapter 6, I investigated the specific interaction effect between resource acquisition and allocation. I found that the connections to well connected terrorist groups and a centralized structure independently increase the likelihood of a terrorist attack as this group is displaying a high operational capability. Additionally, I found that the organizational structure does moderate the effect of a terrorist group's social capital.

Each chapter studied the resource generation process from a different angle. The focus rested on the organizational structure that determines the allocation of resources and the terrorist groups interaction with its environment. Each analysis provided evidence suggesting the interplay between external and internal factors. In the remainder of this chapter, I summarize the main theoretical and empirical contributions stemming from my findings. I conclude by outlining the political ramifications of my research and avenues for future research.

7.1 Theoretical contribution

7.1.1 Focusing on the economic side of terrorism

In this dissertation, I focused on the economic activities of terrorist groups arguing that what they can implement is a function of their resource endowments. I conceptualized terrorist groups as economic entities that need to access available resources and manage them efficiently in order to use them in their attacks. I labeled this acquisition and allocation, which make up the two steps of the resourcing process. I achieved this by combining literature from terrorism research with that from management and organizational research. By arguing that terrorist groups are ultimately economic entities, I was able to customize concepts from management studies to the context of terrorism and terrorist groups.

I argued that during the resourcing process external factors characterizing the context in which a terrorist group operates and internal features of terrorist groups play a significant role. In all three empirical chapters, I analyzed the effect of a selection of these factors. I found that they have an independent effect but also affect each other. As such, the organizational structure of a terrorist group is determined by environmental conditions. The organizational structure itself affects the performance of a terrorist group

(Asal and Rethemeyer, 2008).

and moderates the effect of a terrorist group's social capital on its performance.

7.1.2 Integrating the network and the organizational perspective on terrorism

I argued that focusing on the interaction between the organizational structure and access to external resources is crucial. This dissertation integrates the external embeddedness of a terrorist group with its ability to manage resources internally. Thereby, I combined two strands of research. One strand discusses the internal structure of organizations and its effect on the successful distribution of resources within the organization. The second strand locates the organization within a network of organizations. The central assumption of this approach is that an organization is affected by the connections it has to other actors. With my approach, I am able to analyze the individual and combined effect of a terrorist group's individual attributes and its embeddedness within the network of terrorist groups. However, an organization also requires ties connecting the different sub-unit, i.e., divisions, of the organization. Only then can they successfully utilize resources. Organizations that lack this capacity do not benefit from the acquired resources to the extent that other organizations do that possess this capacity. By utilizing concepts developed in the field of organizational management, strategic management, and network theory, I built what I call the "market model of terrorism." In this model, I explained the behavior of terrorist groups with their economic activities.

7.2 Empirical contribution

7.2.1 Integrating and processing data for large-n cross-sectional analysis with a global scope

This dissertation advances terrorism research as it operationalized difficult to measure features of terrorist groups. It sustains the aspiration to conduct large-n empirical analyses to test a theoretical argument. To that end, I integrated data from various sources, procesed them where necessary to run my analyses, and complemented them with originally coded variables. Studying the behavior of terrorist groups is difficult. They act covertly, making it challenging or nearly impossible to gather information on a large scale. Therefore, it is necessary to identify proxies that can be measured and to improve the measurement of variables. I integrated various data sources to operationalize the concepts of my studies. Since I am interested in-group behavior, I needed to process the data. Most often, terrorism data is event data cataloguing features of attacks. Depending on the concept, the most suitable aggregation strategy was applied.

I studied the interaction between a terrorist group's internal characteristics and external factors. To

do that, I needed to locate a terrorist group within its specific context. I chose a terrorist group's main country of operation and used country-level variables to proxy external conditions to operationalize this context. With this approach, I follow the approach by Young and Dugan (2014).

I originally coded four variables that are crucial for investigating the economic activities of terrorist groups. First, I provided a novel classification of resources that reflects their properties as commodities. By classifying resources based on their tradability, I integrated the terrorism literature with economic literature. In studies of strategic management, resources are not just differentiated between being tangible and intangible, or used in operations or for the maintenance of the organization. Instead, my approach views the resources as a commodity that can be used in business transactions to improve capacities and the competitiveness of an organization (Barney, 1991; Peteraf, 1993). Classifying resources of terrorist groups as tradable or non-tradable is both innovative and valuable as it provides information about the overall capacities that a terrorist group has in a context of other actors. Second, I used the organizational structure as a proxy for efficient resource allocation mechanisms. This is key to open up the "black box" terrorist group. Third, I used network analysis to measure a terrorist group's access to external resources. This offers tremendous potential for quantifying resource exchange. Future research can expand this approach by including not only terrorist groups, but also other actors with whom terrorist groups potentially trade assets. My coding of whether a terrorist group is involved in organized crime or not can be a first indicator where to start and is my fourth originally coded variable. This data set can be used to further study terrorist group behavior under specific conditions.

7.2.2 Classifying involvement in organized crime using a supervised machine learning algorithm

This is the first study to evaluate the predictive importance of factors thought to be associated with increased crime-terror interaction. To do this, I used an inductive machine learning approach using a random forest classifier. The random forest algorithm utilizes an ensemble of individual decision trees resulting in out of sample predictions of whether a terrorist group has engaged in organized crime. I compared the results with the well-known logistic regression classification, which relied on strict functional assumptions. I found that random forest classification performs better, suggesting that future research should be open to such algorithms. The repeatedly mentioned complexity of observational data concerning terrorist group behavior seems to be poorly captured by the regression modeling approach when compared to the random forest.

I additionally assessed the out of sample predictive accuracy of environmental and organizational variables said to drive the involvement in organized crime. It focused the attention on the importance

of organizational variables that affect the involvement of terrorist groups in organized crime. Many studies focus on environmental factors to explain the nexus between terrorism and crime (Eccarius-Kelly, 2012; Flanigan, 2012; Freeman, 2011; Piazza, 2012; Williams, 2012). It is easier to collect data on environmental factors than on group-internal variables. My research suggests that it is important not to over-rely on the findings of studies that focus only on environmental variables. My findings indicated a substantive impact of organizational variables that need to be considered when studying terrorist group's behavior.

7.3 Broader implications

7.3.1 Policy implications

My dissertation highlights the need to look behind the attack and investigate the activities of terrorist groups in preparation of an attack.

Considering counter-terrorism's ambition to prevent attacks, understanding the resourcing process of terrorist groups is crucial, yet often overlooked. This dissertation focused on the economic activities that make the attack possible. The threat posed by terrorist groups is a combination of the willingness and the ability of a terrorist group to commit an attack. Oftentimes, counter-terrorism strategies are aiming to fight the willingness, while being ill equipped to actually do so. My research informs approaches that are tailored to undermine a terrorist group's ability to commit an attack. Counter-terrorism strategies are frequently designed based on the assumption that ideology is driving terrorist groups. Therefore, it is the ideology that they target and try to destroy. However, this is hardly achieved through physical force and might actually backfire by strengthening the terrorist group's resolve and its support base in the process (Kydd and Walter, 2006). My research provides insights informing policy makers and counter-terrorism practitioners to focus on the economic bases of terrorist operations. It is difficult to undermine the mostly clandestine economic networks and activities of terrorist groups. However, focusing on destroying ideology proves more and more ineffective and needs to be revised. My work contributes to the line of research that is dedicated to the economics of terrorism (e.g., Adams, 1986; , N.d.; Vittori, 2011; Shelley, 2014; Clarke, 2015). Based on this research, counter-terrorism researchers and practitioners can devise a response that undermines the resourcing activities of terrorist groups, thus threatening their operational prowess and longevity.

7.3.2 Future research agenda

This dissertation provided important insights into the economic activities of terrorist groups. Its findings and caveats suggest several avenues for future research. My findings suggest that the organizational structure of a terrorist group moderates the effect of its resource acquisition. Future research can build on this finding by further investigating the interaction between the organizational design and the environment. Exploring which organizational design leads to which outcomes under specific environmental conditions can enhance our theoretical and empirical precision and can inform counter-terrorism strategies. Understanding the outcome, i.e., what we observe a terrorist group does, as the result of organizational processes in a specific context can help to identify the terrorism threat more realistically instead of inferring it from ideology and propaganda. I developed an original classification of resources based on their tradability. Future research can explore the economic market of terrorism, where terrorist groups among other actors exchange resources in order to increase their respective capabilities. As case studies (e.g., Liang, 2015; Horgan and Taylor, 1999, 2003; Eccarius-Kelly, 2012) have shown, illicit actors behave similar to firms, which trade surplus to enhance their performance (Ricardo, 1951). The classification provided in this dissertation allows researchers to conduct comparable analyses both global in scale or studying specific cases and also regarding other types of illicit actors.

This research still suffers from small effect sizes. Future research can develop measures that better operationalize the concepts in this dissertation. Measuring group-internal variables is difficult due to the clandestine character of terrorist groups. As my research shows the crucial role of group-internal mechanisms determining a terrorist group's behavior and affecting the impact of environmental factors, future research should focus on identifying and measuring those mechanisms. This confirms previous research attributing a vital role to the environmental conditions, in which a terrorist group operates. Those studies have been driven, in part, by the relatively easy data access regarding those environmental conditions. While important, this strand of research tells only half of the story. This dissertation makes an advance to complement this research by exploring the role of group-internal factors.

Appendix A

Appendix

A.1 List of terrorist groups and originally coded variables

I originally code the organizational structure of terrorist groups and their involvement in organized crime. Table A.1 provides a list of all terrorist groups that are analyzed in chapter 4. The table reports the name of each terrorist group along with its organizational structure and primary country. The organizational structure is originally coded and marks the structural design, which a terrorist group adopted in its first year.

Table A.2 provides a list of all terrorist groups that are analyzed in chapter 5. There are some terrorist groups which are part of both samples. In table A.2, I report whether a terrorist group is involved in organized crime or not.

Table A.1: List of terrorist groups, their organizational structure, and primary country

	Group name	Organizational structure	Primary country
1	1920 Revolution Brigades	Centralized	Iraq
2	Abdullah Azzam Brigades	Centralized	Egypt
3	Abu Sayyaf Group (ASG)	Decentralized	Philippines
4	Achik National Volunteer Council (ANVC)	Centralized	India
5	Adan Abyan Islamic Army (AAIA)	Decentralized	Yemen
6	Afrikaner Resistance Movement (AWB)	Decentralized	South Africa

7	Ahlu-sunah Wal-jamea (Somalia)	Decentralized	Somalia
8	Aitarak Militia	Centralized	East Timor
9	Al Jehad	Centralized	India
10	Al Jihad	Centralized	Egypt
11	al-Ahwaz Arab People's Democratic Front	Centralized	Iran
12	Al-Aqsa Martyrs Brigade	Decentralized	Israel
13	Al-Badr	Centralized	India
14	al-Gama'at al-Islamiyya (IG)	Centralized	Egypt
15	Al-Ittihaad al-Islami (AIAI)	Decentralized	Somalia
16	Al-Mansoorian	Centralized	India
17	Al-Qa'ida	Centralized	Afghanistan
18	Al-Qa'ida in Iraq	Decentralized	Iraq
19	Al-Qa'ida in the Arabian Peninsula (AQAP)	Centralized	Yemen
20	Al-Qassam Brigades	Decentralized	Israel
21	Al-Shabaab	Centralized	Somalia
22	Al-Shabaab al-Mu'minin	Decentralized	Yemen
23	All Tripura Tiger Force (ATTF)	Centralized	India
24	Amr Bil Maroof Wa Nahi Anil Munkir	Centralized	Pakistan
25	Animal Liberation Front (ALF)	Decentralized	United Kingdom
26	Ansar Al Sunnah (Palestine)	Centralized	Israel
27	Ansar al-Islam	Centralized	Iraq
28	Ansar al-Sunna	Centralized	Iraq
29	Armed Forces Revolutionary Council (AFRC)	Centralized	Sierra Leone
30	Armed Islamic Group (GIA)	Centralized	Algeria

31	Asa'ib Ahl al-Haqq	Centralized	Iraq
32	Awami League	Centralized	Bangladesh
33	Besi Merah Putih Militia	Centralized	East Timor
34	Black Widows	Centralized	India
35	Bougainville Revolutionary Army (BRA)	Centralized	Papua New Guinea
36	Burma Communist Party	Centralized	Myanmar
37	Cinchoneros Popular Liberation Movement	Centralized	Honduras
38	Colonel Karuna Faction	Centralized	Sri Lanka
39	Combat 18	Decentralized	United Kingdom
40	Communist Party of Nepal-Unified Marxist-Leninist (CPN-UML)	Centralized	Nepal
41	Congolese National Movement- Lumumba (MNCL)	Centralized	Democratic Republic of the Congo
42	Conspiracy of Cells of Fire	Decentralized	Greece
43	Deccan Mujahideen	Decentralized	India
44	Democratic Front for the Liberation of Rwanda (FDLR)	Centralized	Democratic Republic of the Congo
45	Dima Halao Daoga (DHD)	Centralized	India
46	Earth Liberation Front (ELF)	Decentralized	United States of America
47	Egyptian Tawhid and Jihad	Decentralized	Egypt
48	Force 17	Centralized	Israel
49	Forces for the Defense of Democracy (FDD)	Decentralized	Burundi
50	Forest Brothers	Centralized	Azerbaijan
51	Great Eastern Islamic Raiders Front (IBDA-C)	Decentralized	Turkey

52	Grupo de Combatientes Populares	Centralized	Ecuador
53	Hamas (Islamic Resistance Movement)	Centralized	Israel
54	Harakat ul-Mujahidin (HuM)	Decentralized	India
55	Harkat ul Ansar	Decentralized	India
56	Harkatul Jihad-e-Islami	Decentralized	India
57	Hizb al-Tahrir al-Islami (HT)	Decentralized	Uzbekistan
58	Hizb-I-Islami	Centralized	Afghanistan
59	Hizballah	Centralized	Lebanon
60	Hizbul al Islam (Somalia)	Decentralized	Somalia
61	Hizbul Mujahideen (HM)	Centralized	India
62	Huthis	Decentralized	Yemen
63	Indian Mujahideen	Decentralized	India
64	Informal Anarchist Federation	Decentralized	Italy
65	Islamic Army in Iraq (al-Jaish al-Islami fi al-Iraq)	Centralized	Iraq
66	Islamic Jihad Group (IJG)	Decentralized	Uzbekistan
67	Islamic Movement of Uzbekistan (IMU)	Decentralized	Uzbekistan
68	Islamic State of Iraq (ISI)	Centralized	Iraq
69	Jaish-e-Mohammad (JeM)	Centralized	India
70	Jamaat-E-Islami (India/Pakistan)	Decentralized	Pakistan
71	Jamiat ul-Mujahedin (JuM)	Centralized	India
72	Jammu and Kashmir Islamic Front	Decentralized	India
73	Jaysh al-Muslimin (Army of the Muslims)	Centralized	Afghanistan
74	Jemaah Islamiya (JI)	Decentralized	Indonesia

75	Justice and Equality Movement (JEM)	Decentralized	Sudan
76	Karbi Longri North Cachar Liberation Front (KLNLF)	Decentralized	India
77	Karenni National Progressive Party	Centralized	Myanmar
78	Kata'ib al-Khoul	Decentralized	Russia
79	Kurdistan Freedom Hawks (TAK)	Decentralized	Turkey
80	Kurdistan Workers' Party (PKK)	Centralized	Turkey
81	Lashkar-e-Islam (Pakistan)	Centralized	Pakistan
82	Lashkar-e-Jhangvi	Decentralized	Pakistan
83	Lashkar-e-Taiba (LeT)	Centralized	India
84	Lebanese National Resistance Front	Centralized	Lebanon
85	Lord's Resistance Army (LRA)	Centralized	Uganda
86	Mahdi Army	Centralized	Iraq
87	Moro Islamic Liberation Front (MILF)	Centralized	Philippines
88	Movement for the Emancipation of the Niger Delta (MEND)	Decentralized	Nigeria
89	Mujahedeen Army	Decentralized	Iraq
90	Mujahideen Youth Movement (MYM)	Centralized	Somalia
91	Muttahida Qami Movement (MQM)	Centralized	Pakistan
92	National Council for Defense of Democracy (NCDD)	Decentralized	Burundi

93	National Democratic Front of Bodoland (NDFB)	Centralized	India
94	National Liberation Army (Ecuador)	Centralized	Ecuador
95	National Liberation Army (NLA) (Macedonia)	Centralized	Macedonia
96	National Liberation Front of Tripura (NLFT)	Decentralized	India
97	National Socialist Council of Nagaland-Isak-Muivah (NSCN-IM)	Centralized	India
98	National Socialist Council of Nagaland-Khaplang (NSCN-K)	Centralized	India
99	Nepal People's Army	Centralized	Nepal
100	Niger Delta People's Volunteer Force (NDPVF)	Decentralized	Nigeria
101	Niger Delta Vigilante (NDV)	Decentralized	Nigeria
102	Ogaden National Liberation Front (ONLF)	Decentralized	Ethiopia
103	Oromo Liberation Front	Centralized	Ethiopia
104	Palestinian Islamic Jihad (PIJ)	Centralized	Israel
105	Party for the Liberation of the Hutu People (PALIPEHUTU)	Centralized	Burundi
106	Patriotic Morazanista Front (FPM)	Centralized	Honduras
107	People's Committee against Police Atrocities (PCPA)	Decentralized	India
108	People's Liberation Front of India	Centralized	India

109	People's Revolutionary Army (ERP)	Decentralized	Colombia
110	People's Revolutionary Party of Kangleipak (PREPAK)	Centralized	India
111	People's United Liberation Front (PULF)	Decentralized	India
112	Popular Resistance Committees	Centralized	Israel
113	Quintin Lame	Centralized	Colombia
114	Real Irish Republican Army (RIRA)	Decentralized	United Kingdom
115	Red Hand Defenders (RHD)	Decentralized	Ireland
116	Revolutionary Bolivariano Movement 200	Decentralized	Venezuela
117	Revolutionary Nuclei	Decentralized	Greece
118	Revolutionary Struggle	Decentralized	Greece
119	Revolutionary United Front (RUF)	Decentralized	Sierra Leone
120	Ricardo Franco Front (Dissident FARC)	Decentralized	Colombia
121	Riyadus-Salikhin Reconnaissance and Sabotage Battalion of Chechen Martyrs	Decentralized	Russia
122	Salafist Group for Preaching and Fighting (GSPC)	Decentralized	Algeria
123	Shan State Army	Centralized	Myanmar
124	Sipah-e-Sahaba/Pakistan (SSP)	Decentralized	Pakistan
125	Special Purpose Islamic Regiment (SPIR)	Decentralized	Russia
126	Students Islamic Movement of India (SIMI)	Decentralized	India

127	Sudan People's Liberation Army (SPLA)	Centralized	Sudan
128	Takfir wal-Hijra (Excommunication and Exodus)	Decentralized	Somalia
129	Taliban	Centralized	Afghanistan
130	Tanzim	Centralized	Israel
131	Tawhid and Jihad	Decentralized	Iraq
132	Tehrik-i-Taliban Pakistan (TTP)	Centralized	Pakistan
133	Terai Army	Decentralized	Nepal
134	The Extraditables	Decentralized	Colombia
135	Tupac Amaru Revolutionary Movement (MRTA)	Decentralized	Peru
136	Turkish Communist Party/Marxist (TKP-ML)	Centralized	Turkey
137	United Liberation Front of Assam (ULFA)	Centralized	India
138	United People's Democratic Solidarity (UPDS)	Centralized	India
139	United Popular Action Movement	Centralized	Chile
140	United Self Defense Units of Colombia (AUC)	Decentralized	Colombia
141	White Legion (Georgia)	Decentralized	Georgia
142	White Wolves	Decentralized	South Africa
143	White Wolves (UK)	Decentralized	United Kingdom
144	Young Communist League	Centralized	Nepal

Table A.2: List of terrorist groups involved in organized crime and their organizational structure

	Group name	Organized crime	Organizational structure
1	23rd of September Communist League	No	Decentralized
2	2nd of June Movement	No	Decentralized
3	Abu Hafs al-Masri Brigades	No	Decentralized
4	Abu Nidal Organization (ANO)	Yes	Centralized
5	Abu Sayyaf Group (ASG)	Yes	Decentralized
6	Action Directe	No	Decentralized
7	African National Congress (ANC)	No	Centralized
8	Al-Aqsa Martyrs Brigade	Yes	Decentralized
9	Al-Fatah	No	Centralized
10	Al-Gama'at al Islamiyya (IG)	Yes	Centralized
11	Al-Qaeda	Yes	Centralized
12	Al-Qaeda in Iraq	Yes	Decentralized
13	Alex Boncayao Brigade (ABB)	Yes	Centralized
14	All Tripura Tiger Force (ATTF)	Yes	Centralized
15	Amal	Yes	Centralized
16	Animal Liberation Front	No	Decentralized
17	Ansar al-Islam	Yes	Centralized
18	Ansar al-Sunnah	Yes	Centralized
19	Argentine Anticommunist Alliance (AAA)	No	Centralized
20	Armed Forces of National Resistance (FARN)	Yes	Centralized
21	Armed Islamic Group (GIA)	Yes	Centralized

22	Armed Revolutionary Independence Movement (MIRA)	No	Decentralized
23	Armed Revolutionary Nuclei (NAR)	No	Centralized
24	Armenian Secret Army for the Liberation of Armenia	Yes	Centralized
25	Balochi Liberation Army (BLA)	Yes	Decentralized
26	Basque Fatherland and Freedom (ETA)	Yes	Centralized
27	Black Liberation Army	No	Decentralized
28	Black Panther Group (Palestine)	No	Decentralized
29	Black September	Yes	Centralized
30	Breton Liberation Front (FLB)	No	Centralized
31	Chukakuha (Middle Core Faction)	No	Decentralized
32	Cinchoneros Popular Liberation Movement	No	Centralized
33	Committee of Solidarity with Arab and Middle East Political Prisoners (CSPPA)	No	Centralized
34	Communist Combattant Cells (CCC) (Belgium)	No	Decentralized
35	Communist Party of India - Maoist (CPI-M)	Yes	Centralized
36	Communist Party of Nepal - Maoist (CPN-M)	Yes	Centralized
37	Continuity Irish Republican Army (CIRA)	No	Decentralized

38	Democratic Front for the Liberation of Palestine (DFLP)	No	Centralized
39	Devrimci Halk Kurtulus Cephesi (DHKP/C)	Yes	Centralized
40	Earth Liberation Front (ELF)	No	Decentralized
41	Ejercito Revolucionaria del Pueblo (ERP) (Argentina)	No	Centralized
42	Eritrean Liberation Front	No	Centralized
43	Farabundo Marti National Liberation Front (FMLN)	Yes	Centralized
44	February 28 Popular League (El Salvador)	No	Centralized
45	First of October Antifascist Resistance Group (GRAPO)	No	Centralized
46	Free Aceh Movement (GAM)	Yes	Centralized
47	Free Papua Movement (OPN)	No	Centralized
48	Front for the Liberation of Lebanon from Foreigners (FLLF)	No	Centralized
49	Front for the Liberation of the Enclave of Cabinda (FLEC)	No	Centralized
50	Fuerzas Armadas de Liberacion Nacional (FALN)	Yes	Decentralized
51	Guatemalan National Revolutionary Unity (URNG)	No	Centralized
52	Guerrilla Army of the Poor (EGP)	No	Centralized

53	Hamas (Islamic Resistance Movement)	Yes	Centralized
54	Hezbollah	Yes	Centralized
55	Hizbul Mujahideen (HM)	Yes	Centralized
56	International Revolutionary Action Group (GARI)	No	Decentralized
57	Iparretarrak (IK)	No	Centralized
58	Irish National Liberation Army (INLA)	No	Decentralized
59	Irish People's Liberation Organization (IPLO)	Yes	Decentralized
60	Irish Republican Army (IRA)	Yes	Centralized
61	Islamic Salvation Front (FIS)	No	Decentralized
62	Islamic State of Iraq (ISI)	Yes	Centralized
63	Jaish-e-Mohammed (JeM)	Yes	Centralized
64	Jama'atul Mujahideen Bangladesh (JMB)	Yes	Centralized
65	Jamaat-E-Islami (Bangladesh)	Yes	Centralized
66	Jammu and Kashmir Islamic Front	No	Decentralized
67	Jemaah Islamiya (JI)	Yes	Decentralized
68	Jewish Armed Resistance (JAR)	No	Decentralized
69	Jewish Defense League (JDL)	Yes	Centralized
70	Justice Commandos for the Armenian Genocide	No	Decentralized
71	Kach	No	Decentralized
72	Kosovo Liberation Army (KLA)	Yes	Centralized

73	Kurdistan Freedom Hawks (TAK)	No	Decentralized
74	Kurdistan Workers' Party (PKK)	Yes	Centralized
75	Lashkar-e-Jhangvi (LeJ)	No	Decentralized
76	Lashkar-e-Taiba (LeT)	Yes	Centralized
77	Lebanese National Resistance Front	No	Centralized
78	Liberation Tigers of Tamil Eelam (LTTE)	Yes	Centralized
79	Lord's Resistance Army (LRA)	Yes	Centralized
80	Loyalist Volunteer Forces (LVF)	Yes	Decentralized
81	M-19 (Movement of April 19)	No	Decentralized
82	Macheteros	No	Centralized
83	Manuel Rodriguez Patriotic Front (FPMR)	No	Centralized
84	Maoist Communist Center (MCC)	No	Centralized
85	Maximiliano Gomez Revolutionary Brigade	No	Decentralized
86	Montoneros (Argentian)	Yes	Centralized
87	Moro Islamic Liberation Front (MILF)	Yes	Centralized
88	Moro National Liberation Front (MNLF)	Yes	Centralized
89	Movement for Emancipation of Niger Delta (MEND)	No	Decentralized
90	Movement of the Revolutionary Left (MIR) (Chile)	No	Centralized

91	Mozambique National Resistance Movement (MNR)	No	Centralized
92	National Democratic Front of Bodoland (NDFB)	Yes	Centralized
93	National Liberation Army of Colombia (ELN)	Yes	Centralized
94	National Liberation Front of Tripura (NLFT)	No	Decentralized
95	National Patriotic Front of Liberia (NPFL)	No	Centralized
96	National Socialist Council of Nagaland	No	Centralized
97	National Union for the Total Independence of Angola (UNITA)	Yes	Centralized
98	New Armenian Resistance	No	Decentralized
99	New People's Army (NPA)	No	Decentralized
100	November 17 Revolutionary Organization (N17RO)	No	Decentralized
101	Official Irish Republican Army (OIRA)	No	Centralized
102	Palestine Liberation Organization (PLO)	Yes	Centralized
103	Palestinian Islamic Jihad (PIJ)	No	Centralized
104	Pattani United Liberation Organization (PULO)	No	Centralized
105	Peasant Self-Defense Group (ACCU)	Yes	Decentralized
106	People's Liberation Army (India)	No	Centralized

107	People's Liberation Forces (FPL)	No	Centralized
108	People's Revolutionary Army (ERP)	No	Decentralized
109	People's Revolutionary Organization	No	Centralized
110	People's War Group (PWG)	Yes	Centralized
111	Polisario Front	No	Centralized
112	Popular Forces of April 25	No	Decentralized
113	Popular Front for the Liberation of Palestine (PFLP)	No	Centralized
114	Popular Liberation Army (EPL)	Yes	Decentralized
115	Popular Resistance Committees	No	Centralized
116	Popular Revolutionary Army	No	Centralized
117	Real Irish Republican Army (RIRA)	Yes	Decentralized
118	Rebel Armed Forces of Guatemala (FAR)	No	Decentralized
119	Recontras (Recontras 380)	No	Decentralized
120	Red Army Faction (Baader-Meinhof Group)	No	Decentralized
121	Red Brigades	No	Centralized
122	Red Flag (Venezuela)	No	Centralized
123	Red Hand Commandos	No	Decentralized
124	Red Hand Defenders (RHD)	No	Decentralized
125	Resistenza Corsa (RC)	No	Decentralized
126	Revolutionary Armed Forces of Colombia (FARC)	Yes	Centralized
127	Revolutionary Cell	No	Decentralized

128	Revolutionary Nuclei	No	Decentralized
129	Revolutionary People's Struggle (ELA)	No	Decentralized
130	Revolutionary United Front (RUF)	No	Decentralized
131	Shining Path (Sendero Luminoso)	Yes	Centralized
132	Spanish Basque Battalion (BVE)	No	Decentralized
133	Sudan People's Liberation Army (SPLA)	No	Centralized
134	Taliban	Yes	Centralized
135	Tawind and Jihad	Yes	Decentralized
136	Terra Lliure (TL)	No	Decentralized
137	Tupac Amaru Revolutionary Movement (MRTA)	No	Decentralized
138	Tupac Katari Guerrilla Army (EGTK)	No	Decentralized
139	Tupamaros (Uruguay) (MLN)	No	Centralized
140	Turkish Communist Party / Marxist (TKP-ML)	Yes	Centralized
141	Turkish People's Liberation Army (TPLA)	No	Decentralized
142	Turkish People's Liberation Front (THKP-C)	No	Centralized
143	Ulster Freedom Fighters (UFF)	Yes	Centralized
144	Ulster Volunteer Force (UVF)	Yes	Centralized
145	United Freedom Front (UFF)	No	Decentralized

146	United Liberation Front of Assam (ULFA)	No	Centralized
147	United Popular Action Movement (Lautaro Faction)	No	Centralized
148	United Self Defense Units of Colombia (AUC)	Yes	Decentralized
149	Weather Underground	No	Decentralized
150	Zimbabwe African Nationalist Union (ZANU)	No	Centralized
151	Al-Sa'iqa	No	Centralized
152	al Qaeda in the Arabian Peninsula (AQAP)	No	Centralized
153	Ananda Marga	Yes	Decentralized
154	Ansar al-Sunnah Army	No	Centralized
155	Anti-terrorist Liberation Group (GAL)	No	Centralized
156	Arab Communist Organization	No	Centralized
157	Armenian Revolutionary Army	No	Decentralized
158	Asbat al-Ansar	Yes	Decentralized
159	Ber Satu	Yes	Decentralized
160	Black Star	No	Decentralized
161	Breton Revolutionary Army (ARB)	No	Decentralized
162	Charles Martel Group	No	Decentralized
163	Che Guevara Brigade	No	Centralized
164	Clandestini Corsi	No	Decentralized
165	Harkat-ul-Jihad-al-Islami	Yes	Decentralized
166	Harkat ul-Mujahedin	No	Decentralized
167	Indigenous People's Federal Army (IPFA)	No	Decentralized

168	Informal Anarchist Federation	No	Decentralized
169	Islamic Army in Iraq	No	Centralized
170	Islamic Movement of Uzbekistan	Yes	Centralized
171	Jamiat ul-Mujahedin (JuM)	No	Centralized
172	Japanese Red Army (JRA)	No	Decentralized
173	Lautaro Youth Movement	No	Decentralized
174	Lebanese Armed Revolutionary Faction (LARF)	No	Decentralized
175	May 15 Organization for the Liberation of Palestin	No	Decentralized
176	Purbo Banglar Communist Party (PBCP)	No	Decentralized
177	Revolutionary Struggle	Yes	Decentralized
178	Riyad us-Saliheyn Martyrs' Brigade	No	Decentralized
179	Salafist Group for Call and Combat (GSPC)	Yes	Centralized
180	Tigray Peoples Liberation Front (TPLF)	Yes	Centralized
181	Ulster Defence Association (UDA)	Yes	Centralized
182	United National Liberation Front (UNLF)	Yes	Centralized
183	United People's Democratic Solidarity (UPDS)	No	Centralized

A.2 Logistic regression results

Three logistic regression models were fit to examine variable significance and importance. Table A.3 displays the results. The first model uses every variable outlined in the data and operationalization section. The second model uses only organizational factors, and the third model uses only environmental factors. Comparing model log likelihood, the organizational model explains a greater amount of variation than the environmental factor model does. The AIC statistics also indicates that organizational variables are substantively better than environmental variables at explaining variation in criminal activity.

Examining the fully fitted model, the logistic regression results in three statistically significant predictors. The centralized group structure dummy variable is significant at the 10%-level. Substantively, the logit coefficient indicates a positive relationship between centralized organizational structure and involvement in criminal activity. The coefficient estimates a 1.82 increase in the odds of a terrorist organization being classified as having involvement in criminal activity when it has a centralized organizational structure. This finding is interesting, as it contradicts theoretical and anecdotal expectations about the relationship between decentralized organizational structure and criminal involvement. Namely the expectations concerning the strategic incentive of centralized structures to avoid high-risk activities.

Group size is statistically significant and conforms to the expectations held in the literature. Group size has a positive relationship with involvement in criminal activity. The regression coefficient indicates an average classification odds increase of 1.44 as organizations increase in group size. Finally, the religious ideology dummy variable is statistically significant and indicates a strong positive relationship with criminal involvement; religious groups have a 14.8 odds increase in being classified as having criminal involvement. This finding is difficult to reconcile with both intuition and theoretical expectations. One would expect religious groups to shy away from illicit activities. Yet, this finding suggests the opposite. While not statistically significant, the nationalist ideology dummy indicates the expected relationship as found in the literature. Interestingly, none of the environmental variables are statistically significant in the full model. Nevertheless, military spending and logged GDP are significant in the environment model.

Table A.3: Results

	Dependent variable:		
	crime		
	(1)	(2)	(3)
Centralized Structure	0.662	0.597	
	(0.414)	(0.393)	
No. of Bases	0.049	−0.007	
	(0.189)	(0.177)	
Polity	0.044		−0.031
	(0.048)		(0.039)
Military Spending	0.046		0.122
	(0.104)		(0.083)
No. of Other Groups	0.011		0.005
	(0.018)		(0.014)
Attack Diversity	2.974	1.852	
	(2.515)	(2.202)	
Population (logged)	0.021		0.111
	(0.165)		(0.128)
Real GDP (logged)	0.026		−0.148
	(0.196)		(0.149)
Group Size	0.377***	0.332***	
	(0.107)	(0.095)	
Casualties/ TransAttack	0.010	0.037	
	(0.233)	(0.217)	
Leftist Ideology	0.938	0.830	
	(1.339)	(1.283)	
Religious Ideology	2.720**	2.636**	
	(1.376)	(1.305)	
Nationalistic Ideology	1.190	1.223	
	(1.327)	(1.269)	
Group Age	0.013	0.015	
	(0.013)	(0.013)	
Constant	−5.787*	−4.453***	−0.567
	(3.224)	(1.443)	(2.015)
Observations	183	183	183
Log Likelihood	-94.766	-96.177	-117.751
Akaike Inf. Crit.	219.533	212.354	247.503
Note:			*p<0.1; **p<0.05; ***p<0.01

A.3 Distributional comparison between panel measures and aggregated crosssections

Table A.4: Mean and variance scores across measure types

Variable	Panel mean	Panel variance (SD)	Cross-section mean	Cross-section variance (SD)
Number of Bases	1.6	1	1.6	0.99
Polity Score	4.8	5.8	4.5	5.4
ln (Military Spending)	3.4	3.7	1.9	1.9
Competition	16.5	12.1	17.7	12.3
ln (Population)	10.4	1.4	10.4	1.4
ln (Real GDP)	8.7	1.1	8.7	1.2
Attack Diversity	0.03	0.12	0.04	0.07
Transnational Casualties/ Attack	0.16	0.57	0.51	0.86

A.4 Tenfold cross validation estimation of out-of-sample accuracy

Equation used for estimating tenfold cross validation accuracy. K is for each fold, while Err represents the classification error rate for each fold. The results corroborate the comparison in the main text (bootstrap validation). The random forest (75.2%) is roughly 6% more accurate in classifying out of sample cases when compared to the logistic regression (68.9%) (Figs. A.1 and A.2).

$$CV_k = \frac{1}{k}\sum_{i=1}^{k} 1 - Err_i$$

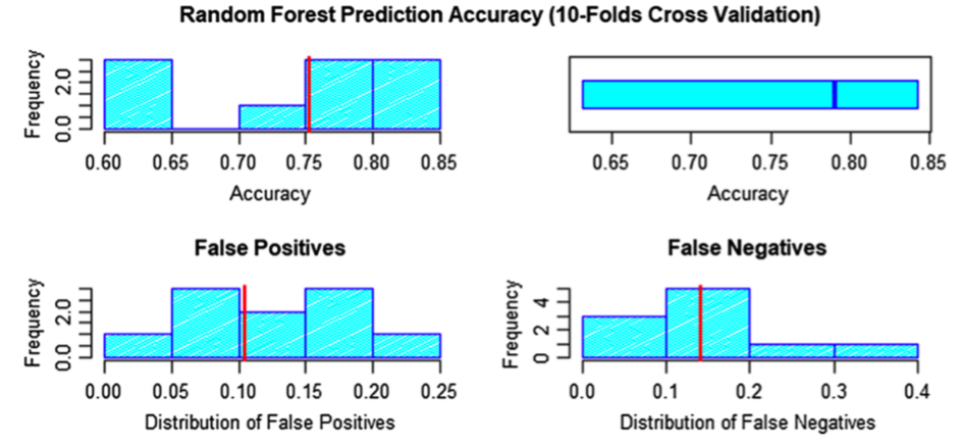

Figure A.1: Tenfold cross validation accuracy for random forest classifier

Random Forest average cross validation accuracy: 75.2%

Average false positive rate (fpr): 10.5%

Average false negative rate (fnr): 14.2%

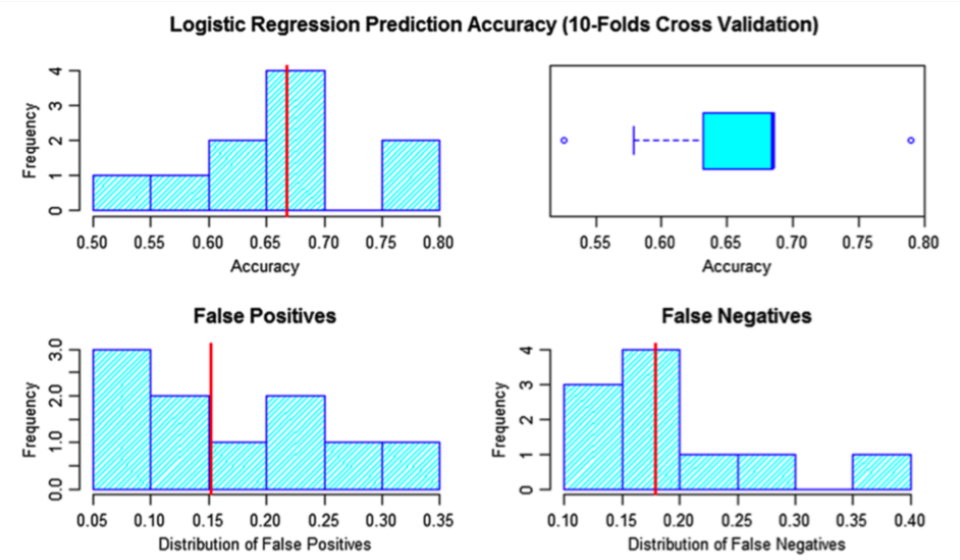

Figure A.2: Tenfold cross validation accuracy for logistic regression

Logistic Regression average cross validation accuracy: 68.9%

Average false positive rate (fpr): 15.5%

Average false negative rate (fnr): 14.2%

A.5 Coding of sophistication of weapon based on weapon type

Table A.5: Coding of sophistication of weapon

Category	Subtype	Sophistication of weapon
Biological weapons	[no corresponding weapon subtype]	1
Chemical weapons	1 = Poisoning	1
Radiological weapons	[no corresponding weapon subtype]	1
Nuclear weapons	[no corresponding weapon subtype]	1
Firearms	2 = (Semi-) automatic weapon	1
	3 = Handgun	1
	4 = Rifle/ Shotgun (non-automatic)	1
	5 = Unknown Gun Type	na
	6 = Other Gun Type	na
Explosives/ Bombs/ Dynamite	7 = Grenade (not RPGs)	1
	8 = Mine	1
	9 = Mail Bomb (letter, package, parcel)	1
	10 = Pressure Trigger	1
	11 = Projectile (rockets, mortars, RPGs, etc.)	1
	12 = Remote Device (trigger, control, detonate)	1
	13 = Suicide Borne IED	1
	14 = Time Fuse	1
	15 = Vehicle	1
	16 = Unknown Explosive Type	na
	17= Other Explosive Type	na
	28 = Dynamite/ TNT	1
	29 = Sticky Bomb	1
Fake Weapons	[no corresponding weapon subtype]	0
Incendiary	18 = Arson/ Fire	0
	19 = Flame Thrower	1
	20 = Gasoline or Alcohol	0
Melee	21 = Blunt Object	0
	22 = Hands, Feet, Fists	0
	23 = Knife or Other Sharp Object	0
	24 = Rope or Other Strangling Device	0
	26 = Suffocation	0
	27 = Unknown Weapon Type	na
Vehicle	[no corresponding weapon subtype]	0
Sabotage Equipment	[no corresponding weapon subtype]	1
Other	[no corresponding weapon subtype]	na
Unknown	[no corresponding weapon subtype]	na

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